DOCUMENT RESUME

ED 227 552 EA 015 473

TITLE North Carolina State Plan for Technical Assistance and Energy Conservation Measures: Grant Programs for Schools and Hospitals and for Buildings Owned by Units of Local Government and Public Care Institutions.

INSTITUTION North Carolina State Dept. of Commerce, Raleigh. Energy Div.

PUB DATE Mar 82

NOTE 85p.; Institutional Building Grants Program.

PUB TYPE Legal/Legislative/Regulatory Materials (090) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC04 Plus Postage.

DESCRIPTORS Climate Control; Economic Status; Elementary Secondary Education; *Energy Conservation; *Facility Improvement; Federal Regulation; Grants; Hospitals; Local Government; Postsecondary Education; Proposal Writing; Public Facilities; Public Schools; Solar Energy; State Federal Aid; *State Government; *State Programs; *Technical Assistance

IDENTIFIERS National Energy Conservation Policy Act 1978; *North Carolina

ABSTRACT

State guidelines for grant applications that follow the regulations of the National Energy Conservation Policy Act of 1978 are presented for North Carolina institutions. Among the 17 procedures spelled out in detail are several that concern eligible institutions' involvement in the development of the state plan, notification of the plan, and submittal of grant applications. Other procedures concern the evaluation of preliminary energy audits and grant applications; funding and the equitable allocation of funds; and assurance that assistance will supplement, not supplant, other funds. Compliance regulations are directed toward nonfederally funded energy audits and technical assistance programs. Other regulations encourage the utilization of solar resource measures and state the qualifications for technical assistance analysts. Finally, procedures are set forth for state management, financial auditing, monitoring, and evaluation. A total of eight tables and forms are also included in the guide. The appendices contain lists of relevant committees, agencies, and associations; a preliminary energy audit form for hospitals and public care facilities; and a ranking of North Carolina counties by wealth and local support for schools. (MLF)

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ED227552

Energy Division

North Carolina Dept. of Commerce

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North Carolina State Plan for Technical Assistance and Energy Conservation Measures:

Grant Programs for Schools and Hospitals and for Buildings Owned by Units of Local Government and Public Care Institutions

The National Energy Conservation Policy Act of 1978; Title III, P.L. 95-619

MARCH 1982

EA 015 473

Institutional Building Grants Program

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A. Soliciting and Considering the Views of Eligible Institutes

According to Federal Rules and Regulations the first element included in the North Carolina State Plan is:

> A Statement setting forth the procedures by which the views of eligible institutions or state-wide organizations representing such institutions, or both were solicited and considered during development of the State Plan. (455.90a)

For the Energy Division of the North Carolina Department of Commerce solicitation and consideration of input from eligible institutions involved three general steps. First, representative agencies responsible to eligible institutions were identified. (Note: Unless otherwise noted, coordinating agencies refer to representative agencies.) Second, input was solicited and considered from institutional representatives during initial stages of State Plan development. And, finally responses to an initial draft of the State Plan were sought and considered.

The Division succeeded in establishing a close working relationship with two state-wide agencies for gathering information about schools and hospitals as early as January, 1978. Mr. Carsie K. Denning, P.E., of the North Carolina State Board of Education and Mr. Conrad M. Taylor, of the Division of Facility Services, Department of Human Resources, joined with the Energy Division at the outset to help insure equitable participation of schools and hospitals and public care institutions. Formal and informal communication led to expanded participation in State Plan development to include the State Commission of Higher Education Facilities, the North Carolina League of Municipalities and the Division of Community Development of the Department of Natural Resources during the period from September 1978 to April 1979. The list of representative agencies has since expanded to that presented in Appendix A.

The Division notified eligible institutions of the final Rules and Regulations through its own monthly newsletter and those of coordinating agencies. These agencies further participated in developing the Preliminary Energy Audit Form and planning the Energy Audit program. Upon approval of its PEA/EA program by the U.S. Department of Energy, the Division provided representative agencies with packets of descriptive information, PEA forms and instructions for dissemination to respective constituents. The representative agencies will review applications for technical assistance and energy conservation measures from appropriate institutions.

In the interval between dissemination of PEA packets and receipt of completed PEA's, the Division began to solidify plans for the development of Energy Audit Workshops and materials with key representative agencies. Contracts were finalized in accordance with plans agreed to by these agencies and the Division's approved Energy Audit Program. Representative agencies for higher education institutions, hospitals, units of local government and public care institutions prepared to train institution personnel and prospective contractors as energy auditors. The Division of Plant Operation of the State Board of Education hired and trained a cadre of 36 energy auditors who would then become available to K-12 institutions throughout North Carolina.

The Division met with representatives of representative agencies on an individual basis to formulate initial stages of the North Carolina State Plan. Their input is reflected in each section of this State Plan. Input was further solicited to an initial draft of the State Plan on October 12, 1979. Modifications were made in accordance

with this input in drafting the final version of the proposed State Plan for submission on October 22, 1979.

B. Notifying Eligible Institutions and Coordinating Agencies of the Contents of the Approved State Plan.

According to Federal Rules and Regulations the second element included in the North Carolina State Plan is:

> The procedures the State will follow to notify eligible institutions and coordinating agencies of the content of the approved State Plan. (455.90b)

Upon approval of the North Carolina State Plan by the U.S. Department of Energy, notification of its availability will be conducted by the Energy Division as follows:

1. Copies will be maintained for distribution upon request at the Division's main office, Room 145, 430 N. Salisbury Street, Raleigh, North Carolina.

2. One copy will be distributed to each coordinating agency. (Appendix A) Each agency will be requested to notify appropriate institutions of the availability of the State Plan.

3. Notice of availability will be published in the Division's monthly newsletter.

4. One copy will be placed at North Carolina State Libraries for review purposes.

5. A press release will be prepared and submitted to each of the five major newspapers in North Carolina for publication.

6. A notice of the availability of the State Plan will be included in the request for applications for Technical Assistance and Energy Conservation Measures. Included within this notice will be a list of locations where the State Plan may be reviewed and agencies from which copies may be obtained.

7. Wherever possible, the Division will use conferences, workshops, seminars and visitations to explain the State Plan and respond to questions concerning its contents, application and implications.

C. Procedures for Submittal of Grant Applications in the State

According to Federal Rules and Regulations the third element included in the North Carolina State Plan is a description of:

> The procedures for submittal of grant applications to the State . . . (455.90c)

The following procedure will be employed by the Energy Division to solicit and process applications for Technical Assistance and Energy Conservation Measures. The procedures will be followed in all program cycles. The specific dates and schedules listed below and elsewhere in this plan are only applicable for the first through fourth program cycles.

1. Applications will be solicited from eligible institutions on December 20, 1979; or, upon U.S. DOE approval of the North Carolina State Plan, if earlier.

2. Applications will be submitted to the Energy Division by January 15, 1980. Second cycle applications will be submitted to the Energy Division by July 1, 1980. Applications for the third and subsequent cycles will be submitted to Energy Division from respective coordinating agencies by June 1 of the year for which the grant cycle is made, but not less than 45 days prior to the final date of transmittal to U.S. Department of Energy published in the Federal Register.

Applications will be reviewed and certified by the respective coordinating agency in accordance with applicable procedures outlined with the fourth grant cycle. Applications will be received by the coordinating agency not less than 30 days prior to the date for the submission of the completed application to the Energy Division.

Applications will be further reviewed by the Division Staff and coordinating agencies for technical accuracy, internal consistency and financial feasibility. Applicants submitting incomplete applications will be notified and provided one week to re-submit complete applications.

The Division will then subject each application to the Evaluation and Ranking procedures of Section F, Equitable Allocations of Funds; Section G, Procedures for Identifying Severe Hardship and for apportioning Funds and Section H, Encouraging Utilization of Solar Resource Measures.

3. Final ranking results and recommendations for Technical Assistance and Energy Conservation Measures Grants will be made to the U.S. Department of Energy by February 15, 1980 (February 1, 1980[1]). Second cycle applications will be forwarded to Department of Energy by August 15, 1980. Third cycle applications will be forwarded to Department of Energy by July 24, 1981. Fourth and all subsequent cycle applications will be forwarded to Department of Energy by July 15 of the year in which the cycle occurs, or no later than the date of transmittal published in the Federal Register governing the grant cycle.

4. U.S. Department of Energy grants will be awarded by March 15, 1980. Second cycle grants will be awarded by September 30, 1980. Third cycle grants will be awarded by September 15, 1981. Fourth and subsequent grant cycles will be awarded in accordance

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1. The date of February 1, 1980, is consistent with IBGP Program Directive Number 12, August 8, 1979, and the end of the First Program Cycle.

with timelines established and promulgated by the Federal Register governing the specific program cycle.

5. The following is a summary of grant cycle application procedures and timelines for Technical Assistance and Energy Conservation Measures Grant Applications:

In the case of Hospitals requiring a Certificate of Need for an Energy Conservation Project in excess of $150,000. Application for Certificate of Need will be submitted to the North Carolina Regional Health Service Agency, the Division of Facility Services of the North Carolina Department of Human Resources and the Energy Division. Initiation of the process will begin immediately after submission of ranked application to the U.S. Department of Energy.

a. State Plan approved and solicitation of formal applications.	December 20, 1979
b. Submission of formal applications.	January 15, 1980
c. Evaluation and Ranking of Grant Applications completed and submission of recommendations to U.S. Department of Energy. Notice to hospitals of possible need to apply for 1122/Certificate of Need approval.	February 15, 1980
d. Grant awards by U.S. Department of Energy.	March 15, 1980

Second Cycle

The timetable to be used for the second program cycle is to be as follows:

a. Solicitation of proposals	May 1, 1980
b. Applications Submitted to Energy Division for Review	July 1, 1980
c. Applications forwarded to U.S. Department of Energy	August 15, 1980
d. Grant Awards by U.S. Department of Energy	September 30, 1980

The timetable to be used for the third program cycle established in accordance with U.S. Department of Energy Program Directive memoranda 3.-3 and 3.-4 effective January 30, 1981 is as follows:

a. Solicitation of proposals	December 15, 1980
b. Applications Submitted for Technical Assistance to coordinating agencies;	
Primary and Secondary Schools	January 23, 1981
Technical/Community Institutes/ Colleges	January 23, 1981

Colleges and Universities	February 6, 1981
Hospitals	March 6, 1981
Local Government	June 1, 1981

c. Technical Assistance Reports to be used for Energy Conservation Measure applications submitted to coordinating agencies for review;

Primary and Secondary Schools	February 20, 1981
Technical/Community Institutes/ Colleges	February 20, 1981
Colleges and Universities	March 6, 1981
Hospitals	April 24, 1981

d. Energy Conservation Measure applications submitted to coordinating agency with reviewed Technical Assistance reports;

Primary and Secondary Schools	April 10, 1981
Technical/Community Institutes/ Colleges	April 10, 1981
Colleges and Universities	April 17, 1981
Hospitals	May 29, 1981

e. Applications submitted to Energy Division from coordinating agency — June 1, 1981

f. Applications forwarded to U.S. Department of Energy — July 24, 1981

g. Grant awards by U.S. Department of Energy — September 25, 1981

The timetable to be used for the fourth program cycle established in accordance with U.S. Department of Energy Program Directive memoranda 3.-3 and 3.-4 effective January 30, 1981 is as follows:

a. Solicitation of Proposals — December 1, 1981

b. Applications submitted for Technical Assistance to Coordinating agencies;

Primary and Secondary Schools	January 15, 1982
Technical/Community Institutes/ Colleges	January 22, 1982
Colleges and Universities	January 29, 1982
Hospitals	February 5, 1982

c. Technical Assistance reports to be used for Energy Conservation Measure applications submitted to coordinating agencies for review

Primary and Secondary Schools	February 19, 1982
Technical/Community Institutes/ Colleges	February 26, 1982
Colleges and Universities	March 5, 1982
Hospitals	March 12, 1982

d. Energy Conservation Measure applications submitted to coordinating agency with reviewed Technical Assistance reports

Primary and Secondary Schools	April 16, 1982
Technical/Community Institutes/ Colleges	April 16, 1982
Colleges and Universities	April 23, 1982
Hospitals	April 30, 1982

e. Applications submitted to Energy Division from coordianting agency — June 1, 1982

f. Applications forwarded to U.S. Department of Energy — July 15, 1982

g. Grant awards by U.S. Department of Energy — September 15, 1982

D. Description and Evaluation of Preliminary Energy Audit Results

According to Federal Rules and Regulations the fourth element included in the North Carolina State Plan is:

> A description and evaluation of the results of preliminary energy audits which have been conducted in the State . . . (455.90d)

The Energy Division and key coordinating agencies developed and distributed a Preliminary Energy Audit Questionnaire comparable to that included in Appendix B for elementary and secondary schools. The Division deferred to the advice and capabilities of each key agency in determining the extent of sampling to be conducted in each of the five identified institutional categories. Consequently, the PEA summary from institutions of higher education is exhaustive and sampling percentages used for extrapolation to all eligible institutions within the categories of elementary/secondary schools, hospitals, units of local government and public care institutions are those selected by the respective agency. For those categories of eligible institutions using less than a 100% sample, PEA Questionnaires will be re-disseminated to all insitutions not included in the initial sample. Also, Energy Audit reports submitted to the Division include all PEA data. This data will be extracted from each Energy Audit report of institutions not included in the original sample and added to the Division's PEA data base.

In addition to storing the numerous data items contained in all completed PEA's, the following summaries reflect the Division's strong interest in learning (1) how much energy each of the five institutional categories consumed and (2) how much total energy was consumed by all eligible institutions considered collectively. Therefore, even though individual data summaries vary by institutional category, the final results in each case is the number of Btu's consumed.

High Education Institutions

Public & Private Non-Profit

Number of Institutions

Gross Square Feet (total): 55,000,000

Gross Square Feet (sample): 9,636,000

Btu's Per Year: 13.10 x 10^{12} Btu

Cost Per Year: $12,700,000

Btu's Per Gross Square Foot Per Year: 249,300

Btu's Per Gross Square Foot Per Hour: 70

Cost Per Gross Square Foot Per Year: $0.60

Energy Conservation Potential (O&M): .99 x 10^{12} Btu/year

Average Solar Potential Index: .53

Elementary/Secondary Schools

Public

Number of Institutions (sample): 50

Number of Institutions (total): 2,442

Electricity: 982.01×10^{10} Btu

Coal: 24.50×10^{10} Btu

#5 Oil: 5.99×10^{10} Btu

#2 Oil: 417.46×10^{10} Btu

Natural Gas: 87.36×10^{10} Btu

Water Heating and Cooking: 15.57×10^{10}

Total: 15.32×10^{12} Btu

Btu's Per Gross Square Foot Per Year: 113,000 Btu

Btu's Per Gross Square Foot Per Hour: 75 Btu

Cost Per Gross Square Foot Per Year: $0.54

Non-Public

Number of Institutions: 313

Number of Students: 55,289

Public School Equivalent: .04937

Total Consumption: $.04937 \times 1532.80 \times 10^{10}$ Btu = 75.68×10^{10} Btu

Community Colleges and Technical Institutes

Number of Campuses: 57

Number of Buildings Sampled: 3

Total Gross Square Feet: 7,335,017

Number of Students: 60,818 FTE

Total Consumption: 60,818 students x 29,086,780 Btu per student per year = 176.90×10^{10} Btu

Total School Consumption: 17.85 x 10^{12} Btu

Total Energy Consumption Potential (O&M): 2.5¢ x 10^{12} Btu

Average Solar Potential Index: .40

Hospitals

Group I (1-125 Beds)

Total Number of Buildings: 84

Number in Sample: 6

Total Number of Beds: 5,694

Number in Sample: 570

Total Consumption in Sample: 2,163.39 x 10^{8} Btu

Extrapolation Factor: 3.795 x 10^{8} Btu per Bed per Year

Total Consumption: 216.111 x 10^{10} Btu

Group II (126-250 Beds)

Total Number of Buildings: 34

Number in Sample: 4

Total Number of Beds: 5,488

Number in Sample: 673

Total Consumption in Sample: 3,157.,61 x 10^{8} Btu

Extrapolation Factor: 4.6918 x 10^{8} Btu per Bed per Year

Total Consumption: 257.486 x 10^{10} Btu

Group III (251-350 Beds)

Total Number of Buildings: 9

Number of Sample: 3

Total Number of Beds: 2,910

Number in Sample: 828

Total Consumption in Sample: 3,885.89 x 10^{8} Btu

Extrapolation Factor: 4.693×10^8 Btu per Bed per Year

Total Consumption: 136.52×10^{10} Btu

Group IV (Over 350 Beds)

Total Number of Buildings: 21

Number in Sample: 4

Total Number of Beds: 10,981

Number in Sample: 2,203

Total Consumption in Sample: $13,971.9 \times 10^8$ Btu

Extrapolation Factor: 6.342×10^8 Btu per Bed per Year

Total Consumption: 696.439×10^{10} Btu

Total Hospital Consumption: 13.06×10^{12} Btu

Btu's Per Gross Square Foot Per Year: 637,000 Btu's

Btu's Per Gross Square Foot Per Year: 73 Btu's

Energy Conservation Potential (O&M): 3.60×10^{12} Btu

Average Solar Potenial Index: .69

Local Government

Total Number of Local Governments: 599

Number in Sample: 10

Total Gross Square Feet: 95.44×10^6 sq. ft.

Total Consumption: $20,931 \times 10^9$ Btu/yr.

Total Cost: $69,100,000

Energy Conservation Potential (O&M): 2.1×10^{12} Btu/year

Average Solar Potential Index: .16

Consumption Per Square Foot/yr.: 224,071

Cost Per Square Foot/yr.: $0.74

Public Care Buildings

Total Number of Public Care Institutions: 633

Number in Sample: 3

Square Feet in Sample: 133,100

Consumption Per Square Foot in Sample: 263,000 Btu/yr.

Energy Conservation Potential (O&M): 7.37×10^{10} Btu/yr.

Average Solar Potential Index: .47

As reflected in Section F, PEA results provided substantial decision-making input to the Division in arriving at the most equitable criterion for evaluating applications for Technical Assistance. It is premature to predict energy savings for this program until results from the preliminary energy audits and energy audits are compiled. We estimate that the total energy usage in eligible buildings to be 44.01×10^{12} Btu/yr., the energy conservation potential for this program to be 9.99×10^{12} Btu/yr. We must emphatically state that this projection may be an over estimate not taking into account restrictions due to practicality of implementing energy conservation measures.

The state will encourage the completion of PEA's with reminders in newsletters and at workshops conducted to monitor the program. A list of typical measures anticipated by institutions and the price of these measures is as follows:

Measure:	
Replaced & repair steam lines	$ 2,600
Install Thermostat Control Valves on Radiators	3,000
Flow Restrictors	300
Storm Windows	2,800
Kw Demand Controller	13,200
Add 3" Fiberglas Insulation	5,950
Enthalpy Controlled Economizer	9,900
6" Fiberglas Insulation	3,150
Storm Windows	2,500
Adjust & Balance Air Handling Equipment	1,000
Adjust & Balance Air Handling Equipment	2,200
Thermostatic Control Valves	5,000

Insulation	3,000
Flow Restrictors	1,100
Install Underground Energy Storage Tank	14,000
Install Insulated Panels	54,000
Install Sunscreens	5,800

E. Procedures for Evaluating and Ranking Technical Assistance and Energy Conservation Measures Grant Applications

According to Federal Rules and Regulations the fifth element included in the North Carolina State Plan consists of:

> The procedures to be used by the State for evaluating and ranking technical assistance and energy conservation measure grant applications pursuant to 455.71, including the weights assigned to each criterion set forth in 455.71b. (455.90e)

The Energy Division has established evaluation and ranking procedures to include:

1. Administrative Review and Certification,

2. Technical Review

3. Final Evaluation and Ranking

Upon submission of applications for Technical Assistance and Energy Conservation Measures Grants, the Division and coordinating agencies will conduct an administrative review of each application for eligibility and inclusiveness. Applications from hospitals and public health institutions will also undergo 1122/Certificate of Need procedures, if necessary, once a grant has been approved by the DOE in accordance with Section C of this State Plan.

A. Technical Assistance Application Review

Eligibility

To be eligible to receive financial assistance for a technical assistance program, an applicant must:

> a. Be a school, hospital, unit of local government or public care institution, all as defined in §455.2, or a coordinating agency representing a group of eligible institutions and which has been granted authority by the institutions to act in their behalf;
>
> b. Be located in a State which has an approved State Plan as described in Subpart H of this part;
>
> c. Have conducted an energy audit or its equivalent, as determined by the State in accordance with the State Plan, for the building for which financial assistance is to be requested, subsequent to the most recent construction, reconfiguration or utilization change which significantly modified energy use within the building;
>
> d. Give assurance that it has implemented all energy conservation maintenance and operating procedures identified as result of the energy audit, or provide a satisfactory written justification for not implementing any specific maintenance and operating procedures so identified; and,
>
> e. Submit an application in accordance with the provisions of this part and the approved State Plan.

(Subpart D, §455.41)

Inclusiveness

a. Applications from schools, hospitals, units of local government, public care institutions and coordinating agencies for financial assistance for technical assistance programs shall include:

1. The applicant's name and mailing address;

2. A written statement certifying that the applicant is eligible under subsection §455.41;

3. The results of the preliminary energy audit and energy audit (or its equivalent) for each building for which financial assistance is requested;

4. A project budget, by building, which stipulates the intended use of all Federal and non-Federal funds, and identifies the sources and amounts of non-Federal funds, including in-kind contributions (limited to the goods and services described in OMB Circular A-102, "Uniform Administrative Requirements for Grants-in-Aid to State and Local Governments," which are directly related to the project and do not include funds derived from revenue sharing or other Federal sources), to beused to meet the Subpart G of this cost-sharing requirements described in part;

5. A brief description, by building, of the proposed technical assistance program, including a schedule, with appropriate milestone dates, for completing the technical assistance program; and

6. Additional information required by the applicable State Plan, and any other information which the applicant desires to have considered, such as information to support an application from a school or hospital for financial assistance in excess of the 50 percent Federal share on the basis of severe hardship. (Subpart E, §455.60(b)).

Each application for Technical Assistance deemed eligible thus far must also be certified by its representative state agency in accordance with §455.70(b).

B. Energy Conservation Measures Application Review

Eligibility

a. To be eligible to receive financial assistance for energy conservation measures, including solar or other renewable resource measures, an applicant must:

1. Be a school or hospital, or both as defined in §455.2, or a coordinating agency which represents groups of eligible institutions and which has been granted authority by the institutions to act in their behalf;

2. Be located in a State which has an approved State Plan as described in Subpart H of this part;

3. Have completed a technical assistance program or its equivalent, as determined by the State in accordance with the State Plan, for the building for which financial assistance is to be requested, subsequent to the most recent construction, reconfiguration or utilization change to the building which significantly modified energy use within the building;

4. Have implemented all energy conservation maintenance and operating procedures which are identified as the result of an energy audit and a technical assistance program, or have provided a satisfactory written justification for not implementing any specific maintenance and operating procedures so identified;

5. Have no plan or intention at the time of application to close or otherwise dispose of the building for which financial assistance is to be requested within the simple payback period of any energy conservation measure recommended for that building; and

6. Submit an application in accordance with the provisions of this part and the approved State Plan.

b. To be eligible for financial assistance, the simple payback period of each energy conservation measure for which financial assistance is requested shall not be less than 1 year nor greater than 15 years, and the established useful life of the measure shall be greater than its simple payback period. (Subpart D, §455.51)

Inclusiveness

c. Applications from schools or hospitals and coordinatinng agencies for financial assistance for energy conservation measures, including solar and other renewable resource measures, shall include:

1. The applicant's name and mailing address;

2. A written statement certifying that the applicant is eligible under §455.51;

3. Identification of each building pursuant to 10 CFR §450.42 (a)(1) through (5) for which financial assistance is requested, including:

i. Name or other identification of each building and its address;

ii. Building category;

iii. Description of functional use;

iv. Ownership; and

v. Size of building expressed in gross square feet.

4. A project budget, by building, which stipulates the intended use of all Federal and non-Federal funds, and identifies the sources and amounts of

non-Federal funds, including in-kind contributions (limited to the goods and services described in OMB Circular A-102, "Uniform Requirements for Grants-in-Aid to State and Local Governments," which are directly related to the project and do not include funds derived from revenue sharing or other Federal sources), to be used to meet the cost-sharing requirements described in Subpart G of this part;

5. A schedule, including appropriate milestone dates, for the completion of the design, acquisition and installation of the proposed energy conservationn measures for each building;

6. Submit a list, by building, of the specific Energy Conservation Measures proposed for funding, indicating the cost of each measure, the estimated energy and energy cost savings of each measure, the projected simple payback period for each measure, computed in accordance with the methodology described in §455.42(c)(5)(vii) and in Section P of this Plan, and the average simple payback period for all measures proposed for the building. The average simple payback period of all measures proposed shall be determined by dividing the total estimated cost by the total projected annual cost saving (from energy savings only);

7. A technical assistance report, completed since the most recent construction, reconfiguration or utilization change to the building which significantly modified energy use, for each building;

8. If the applicant is aware of any adverse environmental impact which may arise from adoption of any energy conservation measure, an analysis of that impact and the applicant's plan to minimize or avoid such impact; and

9. Additional information required by the applicable State Plan, and any additional information which the applicant desires to have considered, such as information to support an application for financial assistance in excess of the 50 percent Federal share on the basis of severe hardship. (Subpart E, §455.60c.)

Each application for Energy Conservation Measures deemed eligible thus far must also be certified by its representative state agency in accordance with Subpart F, §455.70(b). The approved form EIA 145, "Grant Programs for Schools and Hospitals and Buildings owned by Units of Local Government and Public Care Institutions Application" covers criteria for the Review Process described.

Concurrent with the designated administrative review and certification procedures, the Division will conduct a Technical Review of each application and accompanying Energy Audit Report and/or Technical Assistance Report. The technical review will determine technical compliance, consistency and feasibility plus financial justification.

The Division's technical review team will consist of expertise in the areas of engineering, architecture and financial administration. If the review team determines financial justification for an amount less than that requested or determines that an application does not comply with established standards and this State Plan, the applicant will be notified of such determination and will be provided one week to amend the application.

The Division review team will have the authority to recommend reductions in grant application budgets for the following reasons:

1. The application includes expenses that are determined to be unallowable according to Federal Rules and Regulations and this State Plan.

2. The application per building includes expenses that are in themselves considered to be excessive; or, the services or measures are determined to be in excess of the respective project objective. The Division reserves the right to limit single grant award per building recommendations to no more than 10% of its total allocation in any given grant cycle.

Technical Assistance Grant Ranking Factors

All eligible applications received by the Energy Division for a Technical Assistance Grant will be evaluated on a building-by-building basis. Applications will be ranked in descending priority in accordance with the following criteria and accompanying criterion scales.

A. Energy Consumption in Btu per Gross Square Foot per Hour of Operation (Occupancy) (see p. 38).

Criterion Scale:

50 and over
40-49
30-39
20-29
less than 20

B. Annual Energy Costs in Dollars per Gross Square Foot per Year.

Criterion Scale:

$1.01 +
$.76-1.00
$.51-.75
$.26-.50
$.01-.25

C. Type of Fuel

Oil
Natural Gas
Electricity
Coal
Other

D. Estimated Potential Energy Savings in MBTU per Gross Square Foot Per Year

Estimated Energy Conservation Potential will be calculated using the Total Potential Index reported from the Division's Energy Audit as a percentage of the conservation potential of meeting the applicable Energy Performance Standards for New

Buildings[2]. Total Potential Index is determined by identifying potential Energy Conservation Measures during the Energy Audit. Each measure that can be applied to a building has been codified into one of five major areas. Each of these areas has been assigned a "relative importance factor" (RIF). Then, within each major area, "weighting factors" (WF) have been assigned to each energy-conserving measure.

A. Relative Importance Factors (RIF)

Item	Building Size 0-10,000 SF	10-50,000 SF	50,000 + SF
Lighting	0.15	0.15	0.15
Envelope	0.30	0.20	0.15
HVAC Systems	0.35	0.35	0.35
Ventilation	0.15	0.20	0.20
Fan Energy	0.05	0.10	0.15

B. Weighting Factors (WF)

1. Lighting

Reduction of lighting levels is based on selective de-lamping, use of higher efficiency lighting sources, and/or installing switching to allow lights to be cut-off:

		WF
Reduction form:	Over 3 W/GSF	1.0
	2 to 3 W/GSF	0.9
	1 to 2 W/GSF	0.5
Individual Switching		0.7

2. Building Envelope

(a) Caulking and weatherstripping to reduced infiltration, addition of storm windows, and/or closing up windows:

	WF
Over 40% glass	0.8
25-40% glass	0.7
15-25% glass	0.6
Below 15% glass	0.5

(b) Adding wall and roof insulation:

	WF
Single story building	0.2

2. Energy Performance Standards for New Buildings, U.S. Department of Energy, Office of Conservation and Solar Applications (Federal Register, Proposed Rules and Regulations, Tuesday, November 21, 1978, Part III)

3 stories or less	0.1
Over 3 stories	0.0

3. HVAC Systems

(a) Converting existing HVAC system to more efficient system type:

	WF
Reheat, dual duct or multi-zone	0.5
Unit ventilators	0.2
2-pipe fancoil or induction units	0.2
Single zone, VAV, or heating-only systems	0.1
Window units	0.2

(b) Furnace/boiler tune-up and/or add automatic controls; trap maintenance program; upgrade automatic controls, including thermostat conversions or additional of computer-based control systems 0.4

4. Ventilation Air

Reduction of outdoor quantities introduced through HVAC systems or utilization of exhaust air heat recovery methods.

	WF
75 to 100% outside air	1.0
50 to 75%	0.9
25 to 50%	0.8
10 to 25%	0.7

5. Fan Energy

Reduction of fan Performance Standards in MBTU per Square Foot

Per Year

	Zone 3	Zone 4
Schools		
Elementary	81	72
Secondary	65	56
College/University	79	80
Hospitals	208	219

Units of resulting Total Potential Index is then multiplied by the difference between a buildings actual energy consumption and the appropriate Energy Performance Standard as follows for each of the two identified climate zones of North Carolina.

Building Energy Performance Standards in MBTU per Square Foot

	Per Year	
	Zone 3	Zone 4
Schools		
Elementary	81	72
Secondary	65	56
College/University	79	80
Hospitals	208	219
Units of Local Government (offices) Greater than 50,000 S.F.	66	66
Less than 50,000 S.F.	64	62
Public Care Institutions (Nursing Homes)	120	118

Criterion Scale - Btu x 10^5/Yr.

.80+
.61 - .80
.41 - .60
.21 - .40
.01 - .20

E. Solar/Renewable Potential

Potential for Solar/Renewable in an eligible institution will be evaluated according to a Total Potential Index as was used in evaluating Potential Energy Savings above. The following Relative Importance Factor (RIF) and Weighting Factors (WF) will both be incorporated as multipliers in determining an institutions's Total Potential Index. The Relative Importance Factor (RIF) compares the amount of energy available in N.C. from the different renewable resources. The Weighting Factor characterizes the potential of utilizing a particular resource on a particular building.

Criterion Factor	RIF
Solar	
Insolation Available	30
Heating System	30
Building Characteristics	30
Roof Characteristics	30
Wall Characteristics	30
Wind Power	10
Wood	55
Solid Waste	5

(a) Available Insolation

Available insolation is a function of geographic location and site characteristics. Observe whether the building is shaded or unshaded (a building whose roof and south-facing wall are approximately more than half-shaded for more than approximately four hours per day should be considered "shaded"). If the building itself is shaded, note whether there is open, unshaded land available adjacent to the building site.

	WF
Unshaded	0.3
Open land	0.3
Shaded	0.0

(b) Heating System

Note the fuel used for space heating, air-conditioning, and water heating.

	WF
All electric	0.0
Steam	0.1
Hot water	0.3

(c) Building Characteristics

Refer to the audit form for the description of building size and shape, and the locaton of heating, air conditioning, and water heating equipment. A "favorable" building is one which is compact (i.e., square or rectangular), in which the equipment is in one location on the roof or adjacent to the south-facing wall. A building which is "fair" would be other than compact (i.e., E-shaped, L-shaped, etc.) but in which the equipment is in one location on the roof or adjacent to the south-facing wall, or a building which is compact but in which the equipment is within 5 floors of the roof or 50 feet of the south-facing wall. A building which is not compact and in which the equipment is located beyond five floors of the roof and 50 feet of the south-facing wall is to be characterized as "moderate". A highly irregular building or one in which equipment is in scattered locations — most of which are more than five floors from the roof or 50 feet from the south-facing wall — is characterized as "poor".

	WF
Favorable	0.10
Fair	0.08
Moderate	0.05
Poor	0.02

(d) Roof Characteristics

Refer to the audit form for the description of the roof pitch, materials, structural materials and obstructions. Characterize the building as "favorable" if the roof is flat or pitched nearly to the south, if the roofing is built-up, shingled or otherwise sufficiently durable to withstand mounting and maintaining solar collectors, if the structural members are strong enough to support additional weight and the roof area is free of obstructions. A "fair" rating would be given a building meeting the above conditions except that the roof pitch is only approximately in the direction of south or where there are roof obstructions. Describe a building as "moderate" if the roof pitch is only approximately toward the south and there are roof obstructions. A building which meets none of these conditions is characterized as "poor".

	WF
Favorable	0.10
Fair	0.08
Moderate	0.05
Poor	0.02

(e) Wall Characteristics

Determine the glass area of the south-facing walls as a percentage of the total wall area, noting the construction material:

	WF
Over 75% glass, masonry	0.10
Over 75% glass; aluminum or metal	0.07
Over 75% glass; wood or other	0.06
25%-75% glass; masonry	0.07
25%-75% glass; aluminum or metal	0.06
25%-75% glass; wood or other	0.04
Under 25% glass; masonry	0.05
Under 25% glass; aluminum or metal	0.03
Under 25% glass: wood or other	0.02

(f) Wind Speed

Determine average monthly wind speed using data supplied in Table III. Note whether there are natural or man-made barriers in the direction of the prevailing winds.

	WF
Greater than 15 mph, no barriers	0.10
Between 10-15 mph, no barriers	0.05
Greater than 15 mph, some obstructions	0.07
Between 10-15 mph, some obstructions	0.03
Less than 10 mph	0.02

(g) Wood/waste

The use of wood or solid waste as a heat source is generally limited by the type of heating system and its size.

	WF
All electric facility	0.0
Hot water or steam, less than 200,000 GSF	0.5
Hot water or steam, greater than 200,000 GSF	1.0
Hot air heating	0.3

Criterion Scale:

26+
20.0 - 25.5
14.0 - 19.5
8.0 - 13.5
2.4 - 7.9

F. Credit for Non-Federally Funded Energy Audit

A Score Factor of 10 will be used for those applicants having conducted an Energy Audit without the use of federal funds. No criterion scale is necessary.

Table I, Technical Assistance Evaluation Form will be used to calculate each applicant's total evaluation score. Resulting scores will be ranked in descending priority for determining funding recommendations and for applying Hardship Evaluation Criteria from Section G. In the event that two or more applications tie in evaluation score the following criteria will be used to break the tie if necessary. Institutions which completed the energy audit without Federal funds will be given preference. Applications which remain tied will be given preference in the order they were received.

Energy Conservation Measure Grant Ranking Factors

All eligible applications received by the Energy Division for Energy Conservation Measures Grants will be evaluated on a building-by-building basis. Applications will be ranked in descending priority in accordance with the following criteria and accompanying criterion scales:

A. Payback

The average simple payback period of all energy conservation measures proposed will be determined by dividing the total estimated cost by the total projected annual cost savings. The acceptable range for average simple payback will be one to fifteen years.

Criterion Scale: See Table III

B. Annual Cost Savings for Conversion Measures

This criterion will be used only for Energy Conservation Measures proposing to convert a building's energy use from an existing source to (1) a renewable source of energy or (2) coal. Fuel conversions from oil, natural gas, or other petroleum product to another form of petroleum product including oil and natural gas; or conversions from electric energy sources to a petroleum or petroleum distillate product shall not be included among annual cost savings for conversion measures. The value of this criterion will be calculated by dividing estimated annual savings of each conversion measure by the total annual cost savings of all Energy Conservation Measures proposed for a given building.

The value of each conversion measure will be weighted in descending priority for conversion to (1) renewable energy sources and (2) coal, in accordance with weights designated in Table II.

TABLE I

TECHNICAL ASSISTANCE EVALUATION FORM

Criterion (1)	Criterion Scale(2)	Score Factor(3)	Relative Importance Factor(4)	Criterion Score(5)	Evaluation Score(6)
A Gross Energy Consumption ($Btu/ft^2/HR$)	1. 50+ 2. 40-49 3. 30-39 4. 20-29 5. less than 20	1. 9 2. 8 3. 7 4. 6 5. 5	.20	$(3)_a x (4)_a = 5_a$	
B Annual Energy Costs (dollars/ft^2)	1. $1.01+ 2. $ .76-1.00 3. $ .51- .75 4. $ .26- .50 5. $ .01- .25	1. 9 2. 8 3. 7 4. 6 5. 5	.05	$(3)_b x (4)_b = 5_b$	
C Type of Fuel	1. oil 2. gas 3. electricity 4. coal 5. geothermal	1. 9 2. 8 3. 7 4. 6 5. 5	.10	$(3)_c x (4)_c = 5_c$	
D Potential Savings ($Btu \times 10^5/ft^2$)	1. .80+ 2. .61-.80 3. .41-.60 4. .21-.40 5. .01-.20	1. 9 2. 8 3. 7 4. 6 5. 5	.40	$(3)_d x (4)_d = 5_d$	
E Solar/Renewable	1. 26+ 2. 20.0-25.5 3. 14.0-19.5 4. 8.0-13.5 5. 2.4- 7.9	1. 9 2. 8 3. 7 4. 6 5. 5	.15	$(3)_e x (4)_e = 5_e$	
F Non-Federally Funded Energy Audit	None	10	.10	$(3)_f x (4)_f = 5_f$	
Total			RIF= 1.0	$(5)_x (6)$	

Criterion Scale:

.40 +
.30 - .39
.20 - .29
.10 - .19
less than .09

C. Annual Energy Savings

Proposed energy conservation measures will be evaluated according to estimated annual energy savings from the Technical Assistance Analysis with weighting factors in descending priority with the type of energy to be saved; (1) oil, (2) natural gas, and (3) electricity. For the purpose of determining the anticipated Btu energy savings of measures conserving electricity, a conversion factor of 3413 Btu/Kwh shall be used.

The value of this criterion will be calculated similar to that for conversion measures by dividing the estimated annual energy savings of each proposed measure by the total annual energy savings of all measures proposed.

Criterion Scale:

.40 +
.30 - .39
.20 - .29
.10 - .19
less than .09

Table II, Energy Conservation Evaluation form, will be used to calculate each application's total Weighted Score for each criterion. Each Total Weighted Score from Table II will be transferred to Table IV for computation of applicants' Total Evaluation Scores.

Total Evaluation Scores will be ranked in descending priority for determining funding recommendations and for applying allocation procedures of Section F and Hardship Evaluation Criteria From Section G. In the event that two or more applications tie in evaluation score the following criteria will be used to break the tie if necessary. Institutions which completed the technical assistance without Federal funds will be given preference. Should ties remain after the criteria listed above has been applied, institutions which completed the energy audit without Federal funds will be given preference. Applications which remain tied will be given preference in the order they were received.

TABLE II

ENERGY CONSERVATION MEASURES EVALUATION FORM

Criterion (a)	Criterion Scale (b)	Score Factor (c)	Weighting Factors: Energy Conversion Measures — Renewable 1.0 (d_1)	Coal 0.55 (d_2)	Coal 0.45 (d_3)	Subtotal (d_4)	Energy Saving Measures — Oil 0.53 (e_1)	Gas 0.29 (e_2)	Elec. 0.18 (e_3)	Sub-total (e_4)	Total Weighted Score (f)
A Payback (Cost/Benefit)	One-Fifteen Years	Find Score Factor for Indicated Payback Period from Table III									c=f
B Annual Cost Savings for Conversion Measure (Ratio of Energy Conservation Measure Cost to Total Savings)	1. .40 & over 2. .30-.39 3. .20-.29 4. .10-.19 5. less than .09	1. 9 Number of 2. 8 Measures to 3. 7 + which 4. 6 criterion is 5. 5 being applied	1.0 1.0			$d_1+d_2=d_3$ $d_1+d_2=d_3$					cxd_4=f cxd_4=f
C Annual Energy Savings (Ratio of Energy Conservation Measures MBTU/sq.ft.Savings to Total MBTU/sq.ft. Savings)	1. .40 & over 2. .30-.39 3. .20-.29 4. .10-.19 5. less than .09	1. 9 Number of 2. 8 measures to 3. 7 + which 4. 6 criterion is being applied	1.0 1.0 1.0							$d_1+e_1=e_4$ $d_1+e_2=e_4$ $d_1+e_3=e_4$	cxe_4=f cxe_4=f cxe_4=f
D Climate (Degree Days Above Normal)	1. 400+ 2. 300-399 3. 200-299 4. 100-199 5. 99 or less	1. 9 2. 8 3. 7 4. 6 5. 5									c=f

TABLE III

SCORE FACTORS FOR PAYBACK CRITERION

Payback in Years	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	9.00	8.97	8.94	8.91	8.88	8.86	8.83	8.80	8.77	8.74
2	8.71	8.68	8.65	8.62	8.59	8.57	8.54	8.51	8.48	8.45
3	8.42	8.39	8.36	8.33	8.30	8.28	8.25	8.22	8.19	8.16
4	8.13	8.10	8.07	8.04	8.01	7.99	7.96	7.93	7.90	7.87
5	7.84	7.81	7.78	7.75	7.72	7.70	7.67	7.64	7.61	7.58
6	7.55	7.52	7.49	7.46	7.43	7.41	7.38	7.35	7.32	7.29
7	7.26	7.23	7.20	7.17	7.14	7.12	7.09	7.06	7.03	7.00
8	6.97	6.94	6.91	6.88	6.85	6.83	6.80	6.77	6.74	6.71
9	6.68	6.65	6.62	6.59	6.56	6.54	6.51	6.48	6.45	6.42
10	6.39	6.36	6.33	6.30	6.27	6.25	6.22	6.19	6.16	6.13
11	6.10	6.07	6.04	6.01	5.98	5.96	5.93	5.90	5.87	5.84
12	5.81	5.78	5.75	5.72	5.69	5.67	5.64	5.61	5.58	5.55
13	5.52	5.49	5.46	5.43	5.40	5.38	5.36	5.32	5.29	5.26
14	5.23	5.20	5.17	5.14	5.11	5.09	5.06	5.03	5.00	5.00
15	5.00									

TABLE IV

ENERGY CONSERVATION MEASURES EVALUATION FORM

Criterion	Relative Importance Factor(1)	Weighted Score(2)	Final Criterion Score(3)
A Payback (Cost-Benefit)	.70		
B Annual Cost Savings for Conversion Measure	.15		
C Annual Energy Savings	.15		

Total Evaluation Score _____

33

F. Equitable Allocation of Funds

According to Federal Rules and Regulations the sixth element included in the North Carolina State Plan consists of:

> The procedures that the State will follow to insure that funds will be allocated equitably within the State, including procedures to insure that funds will not be allocated on the basis of size or type of institution but rather on the basis of relative need taking into account such factors as cost, energy consumption, and energy savings, in accordiance with 455.71. (§ 455.90f)

In order to insure equitable allocation of funds for Technical Assistance and Energy Conservation Measures Grants, the Energy Division has established evaluation and ranking procedures in Section E that are based on relative need. Evaluation criteria take into account factors of cost, energy consumption and energy savings and in no way give preference to eligible institutions on the basis of size or type.

As applications or Technical Assistance and Energy Conservation Measures are submitted to the Division, they will be sorted for evaluation and ranking in accordance with the following three groupings:

1. Applications for Technical Assistance from Units of Local Government and Public Care Institutions. Technical Assistance evaluation criteria will then be applied to all Technical Assistance applications equally from units of local government and public care institutions within this group.

2. Applications for Technical Assistance from Schools and Hospitals. Technical Assistance evaluation criteria will then be applied equally to all Technical Assistance applications from eligible school and hospitals within this group.

3. Applications for Energy Conservation Measures from Schools and Hospitals. Energy Conservation Measures evaluation criteria will then be applied equally to all applications for Energy Conservation Measures from eligible schools and hospitals within this group.

4. Applications for Non-Federal Technical Assistance Credit Toward Energy Conservation Measures. Costs of TA programs accomplished without the use of federal funds may be counted toward an institution's match for an ECM grant. DOE may allow all or part of the TA costs to count toward the match. ECM applications requesting such credit must be reviewed on a case-by-case basis to ensure that credit is given only for those costs which are directly related to the content of a TA program.

An institution applies for TA credit by adding the cost of the TA project to the cost of the ECM's for which it is applying. The federal share is calculated on the aggregate amount and the TA cost may be considered as part of the institution's match.

Example:

An institution completes a TA on its own at a cost of $6,000. The institution then decides to apply for ECM's totalling $60,000. The institution submits an

ECM application totalling $66,000. The federal share is $33,000. The additional match required from the institution is $33,000 - $6,000 = $27,000.

5. Applications for Non-Federal Energy Conservation Measures as Credit Toward Further ECM's. On October 24, 1979, the U.S. Department of Energy issued a notice which stated:

"Applicant expenditures for . . . . one or more Energy Conservation Measures commenced after November 8, 1978 for a building may be wholly or partially classified at the discretion of the Secretary as matching non-federal funds for the purposes of matching grants awarded for Energy Conservation Measures."

This credit may be allowed under the following conditions:

1. The ECM(s) for which credit is being requested was recommended in a TA report.

2. The ECM(s) for which credit is being requested, is included in the institutions ECM application for the purposes of evaluating and ranking the application based on both the new ECMs and the ECM already implemented.

3. The ECM(s) for which credit is being requested is otherwise qualified as an eligible ECM (payback 1-15 years, payback less than useful life, etc.).

An institutions applies for ECM credit by including the non-federal ECM with the ECM projects for which it is applying. The application will then be evaluated and ranked as if all the ECMs were yet to be implemented. The federal share will be calculated on the aggregate amount of all the ECMs and the non-federal ECM may be considered as part of the institutions match.

Example:

An institution implements a qualified ECM on its own at a cost of $10,000. The institution then decides to apply for more ECMs totalling $100,000. The institutions submits an ECM application for a total of $110,000. The federal share is $55,000. The additional match required from the institution is $55,000 - $10,000 = $45,000.

The Energy Division considers the potential for energy savings to be the primary goal to be achieved in this program. However, results of the preliminary energy audit suggest that if reported by year reported energy use and energy conservation potential will favor individual hospitals and disfavor elementary and secondary schools. For example, total energy consumption figures from the PEA summaries were used to arrive at the average number of BTU's per square foot of energy being consumed annually by each type of eligible institution as follows:

Eligible Institutions	Btu/S.F./Yr.
Schools:	
Elementary/Secondary:	113,000
Colleges/Universities:	249,300

Hospitals:	637,000
Units of Local Government:	224,071
Public Care Institutions:	263,000

After assessing the values above, the Division came to the conclusion that, as an evaluation criterion, Btu/S.F./Yr. would discriminate among eligible institutions on the basis of type of institution. It does not take into consideration the energy use in all schools, all hospitals, or all universitites.

This criterion does not reflect all the benefits of conducting technical assistance projects in an elementary or secondary school. Although these projects offer the potential for energy conservation in smaller amounts per facility, the projects may be repeated many more times to achieve the same total energy savings. Furthermore, at this time the Energy Division does not have sufficient information to compare the cost effectiveness of energy conservation measures in different institutions. Using this criterion may mean not funding many projects in the technical assistance phase which would be extremely cost effective to implement.

Therefore, the Division introduced two equitability factors into the consumption factor of Btu/S.F./Yr. for arriving at the evaluation criteria of Section E for Technical Assistance Applications.

1. Hours of operation or occupancy were determined to provide the Division with a more equitable estimate of a building's energy consumption because it takes into consideration both energy consumption and differing operating or occupancy times. (See Criterion A in Table I, Section E).

2. Differing potentials for energy savings were estimated by comparing actual institutional energy-use with the differing Building Energy Performance Standards for New Buildings established by the U.S. Department of Energy. (See Criterion D in Table I of Section E). This criterion will permit the Division to determine potential for energy savings in eligible institutions by taking into account the impact of building functions on its potential for saving.

As indicated above, evaluation criteria will be applied equally to all applications within each of the three groupings of eligible institutions. This three-fold procedure for sorting applications insures equitability in that it does not discriminate among eligible institutions on the basis of size or type of institution. Further equitability is insured through the subsequent application of evaluation criteria based on relative need.

As applications for Technical Assistance and Energy Conservation Measures are each evaluated on the adopted criteria, they will be ranked in descendinng priority according to evaluation scores. (See Section E of this Plan) Technical Assistance evaluation scores for applicants will be taken from a completed "Technical Assistance Evaluation Form" comparable to that presented in Table I of Section E. Similarly, Energy Conservation Measures evaluation scores for each applicant will be taken from a completed "Energy Conservation Measures Evalaution Form" comparable to that presented in Table IV of Section E.

At this point, the Energy Division will have three groups within which eligible institutions are ranked in descending priority according to their individual evaluation scores. The Division will then attach the dollar value for which each ranked application

qualifies. Then it will proceed down each of the three ranked lists of eligible institutions and identify each institution it will recommend for funding. As each applicant receives a recommendation for funding the Division will subsequently deduct the recommended amount from its total allocation for each of the three groups identified. Determination of the total allocation and apportionment of each group is presented in Section Q of this Plan.

The Division will, therefore, proceed down each of the three ranked lists of applicants, deducting the dollar value to be recommended from the total allocation for each group until that allocation is exhausted. Should any list of applicants be exhausted before its maximum allocation has been spent, unused funds will be returned to the Federal government. When each allocation is completely dispersed among ranked applicants, no applications lower in rank will be recommended for 50/50 matching funds. However, if an applicant chooses to withdraw his application after being notified of the Division's recommendation for funding, the Division will proceed farther down the ranked list in that applicant's allocation group. Before making the final recommendations for 50/50 matching funds, the Division will tabulate the total amount of funds it has initially identified for funding within both the Technical Assistance and Energy Conservation Measures categories of schools and hospitals. Neither schools nor hospitals will receive less than 30% of the State's total allocation. If either category has been identified to receive less than 30% of the total allocation, the Division will begin removing the lowest ranked school or hospital, whichever is over its allocation from among those identified for funding. Then the Division will again proceed farther down the ranked list to the first school or hospital that will add to the deficient category. This process will continue until both categories of schools and hospitals include grant recommendations of at least 30% of the State's total allocation for schools and hospitals.

Any allocated Technical Assistance funds for schools and hospitals not exhausted as a result of an insufficient number of applications shall be used as the federal share of Technical Assistance credit toward Energy Conservation Measures. Any allocated Technical Assistance funds for schools and hospitals not exhausted as a result of both an insufficient number of Technical Assistance applications and an insufficient number of Energy Conservation Measures requesting Technical Assistance credit will be transferred into the group consisting of ranked applications for Energy Conservation Measures.

After determining those applicants it will recommend for funding on a 50/50 matching basis, the Division will identify those recommended applicants that have requested consideration for Federal funding in excess of 50% on the basis of severe economic hardship. The procedures presented in Section G will be applied to those applicants requesting such funding in excess of 50%. The exact amount of Federal funds in excess of 50% that each hardship applicant is qualified to receive will be determined by those procedures in Section G. The additional funds recommended in excess of 50% will be derived from the State's 10% allocation for economic hardship. If all grant funds which may be allocated on a 50/50 matching basis have been allocated and some portion of the State's 10% allocation for economic hardship remains, the State may award both the 50% match and that amount in excess of 50% to the highest ranked hardship applicant or applicants.

Any portion of the State's 10% allocation for economic hardship not exhausted as a result of an insufficient number of applications requesting consideration for Federal funding in excess of 50% will be transferred into those funds to be used for the funding of additional projects not requesting Federal funding in excess of 50%.

The Energy Division reserves the right to limit each applicant to a single grant award of no more than 10% of its total allocation in any given grant cycle.

G. Procedures for Identifying Severe Hardship and for Apportioning Funds

According to Federal Rules and Regulations the seventh element included in the North Carolina State Plan consists of:

> The procedures that the State will follow for identifying schools and hospitals experiencing severe hardship and for apportioning the funds that are available for schools and hospitals in a class of severe hardship. Such policies and procedures shall be in accordance with §455.71(d). (§455.90g)

Requirements specified in this regulation involve two related issues. The first is the establishment of criteria to be used to identify severe economic hardship. The second included procedures to be used to determine an applicant's qualified level of Federal funding in excess of 50%.

Applicants who submit applications for consideration under this special category of hardship will do so because provisions in the Federal regulations include allowances for economic hardship as follows:

> The secretary may award 10 percent of the total amount allocated to a state for schools and hospitals for technical assistance and energy conservation measures in a given grant program cycle to cover more than 50 percent, but not to exceed 90 percent, of the cost of a technical assistance program or an energy conservation measure. These additional amounts may be awarded to applicants in a class of severe hardship, ascertained by the State in accordance with the State Plan for buildings recommended by the State pursuant to §455.71(d)(3), and in amounts determined pursuant to §455.71(d)(2).

Before the Energy Division begins applying hardship criteria to applications for Technical Assistance and Energy Conservation Measures Grants, it will have first completed the evaluation and ranking procedures identified in Section E. Then, those applications ranked sufficiently high to qualify for 50/50 matching funds, will warrant application of economic hardship criteria.

Since applications will have, to this point, been evaluated and ranked using procedures that assure equitability, the Division considers the application of institution - specific hardship criteria to be the most accurate determinants. Therefore, differing criteria will be employed for each eligible institutional type in evaluating applications on thee basis of severe economic hardship.

College and University Severe Hardship Criteria

Determination of the extent of severe hardship for applications from Colleges and Universities wills be based on the following criteria developed in conjunction with the North Carolina State Commission on Higher Education Facilities and the North Carolina Association of Independent Colleges and Universities.

A. Basic Educational Opportunity Grants (BEOG) per FTE student as follows:

i. Basic Educational Opportunity Grant information will be found from the North Carolina Higher Education Data (NCHED) Survey, A-10, Section A, Page 1, A2.

ii. FTE information will be found from the NCHED Survey A-1.1, Line 14, Column 14.

B. Total Education and General Expenditure per FTE student as follows:

i. Total Education and General Expenditures will be found from the Higher Education General Information Survey (HEGI5), 2300-4, Part B, Line 12.

C. Physical Plant Indebtedness per FTE student as follows:

i. Physical Plant Indebtedness will be found from HEGI5, 2300-4, Part D, Line 4.

Criteria Scales in each of the above criteria will coincide with state-wide percentile rankings generated by the coordinating agencies and will include:

Percentile
.80 +
.61 - .80
.41 - .60
.21 - .40
.01 - .20

Table V will be used to calculate the percentage of federal hardship funding above 50% an applicant is qualified to receive for a Technical Assistance or Energy Conservation Measure Grant. Multiplying the total hardship evaluation score by 100 will convert the decimal score to the total percentage of federal funds the applicant qualifies for. Subtracting 50% from this figure will provide the percentage of hardship funds for which the applicant applies.

Hospital Severe Hardship Criteria

Determination of the extent of severe hardship for applications from hospitals will be based on the following criteria developed in conjunction with the North Carolina Hospital Association.

A. Operating Margin

The Operating Margin is a ratio of Net Revenue to Total Revenue from Patient Revenue and Other Operating Income where:

i. Net Revenue = Patient Revenue + Other Operating Income - Deductions from Revenue - Expenses

Criteria Scale:

- 5% or less
- 2% - 5%
+ 1% - 2%
+ 4% + 1%
Greater than + 4%

B. Percent Occupancy

Criteria Scale:

.65 or less
.70 - .64
.75 - .71
.80 - .74
.80 +

Table VI will be used to calculate the percentage of Federal hardship funding above 50% an applicant is qualified to receive for a Technical Assistance or Energy Conservation Measures Grant. Multiplying the Total Hardship Evaluation Score by 100 will convert the decimal score to the total percentage of Federal funds the applicant qualifies for. Subtracting 50% from this figure will provide the percentage of hardship funds for which the applicant applies.

Elementary and Secondary Schools (Public and Non-Public) and Community Colleges and Technical Schools Severe Hardship Criteria

Determination of the extent of severe hardship for applications from public and non-public elementary and secondary schools, community colleges and technical schools will be based on the following Wealth Index for counties within North Carolina.

Wealth Index = (.78 Property Value Index + .22 Sales Tax Index) .50 General Fund Index

Where;

i. The Property Value Index is the ratio of Assessed Property Valuation per student for a given county,

ii. The Sales Tax Index is the ratio of total collected sales tax per student, and

iii. The General Fund Index is the ratio of county contribution to the State General fund (Income Tax) per student.

Table VII has been established to coincide with the increments of an exponential distribution of the existing state ranking of Wealth Indices for each county within the State of North Carolina. The 1975-76 Wealth Index of the county within which a public or non-public elementary or secondary school, community college or technical school will be assigned as that institution's Wealth Index.

The percentage of total funds for Technical Assistance or Energy Conservation Measures for which an applicant qualifies will be determined by locating the applicant's Wealth Index or Table VII. Subtracting 50% for 50/50 matching funds will inturn provide the percentage of hardship funding for which an applicant qualifies.

TABLE V

College/University Severe Hardship Evaluation Form

(1) Criterion	(2) Criterion Scale (Percentile)	(3) Score Factor	(4) Relative Importance Factor	(5) Criterion Score (5=3x4)
A. Basic Educational Opportunity per FTE Student	1 .80 +	.9		
	2 .61 - .80	.8		
	3 .41 - .60	.7	.25	
	4 .21 - .40	.6		
	5 .01 - .20	.5		
B. Total Education and General Expenditure per FTE Student	1 .80 +	.9		
	2 .61 - .80	.8		
	3 .41 - .60	.7	.50	
	4 .21 - .40	.6		
	5 .01 - .20	.5		
C. Physical Plant Indebtedness per FTE Student	1 .80 +	.9		
	2 .61 - .80	.8		
	3 .41 - .60	.7	.25	
	4 .21 - .40	.6		
	5 .01 - .20	.5		

Total Hardship Evaluation Score_____

TABLE VI

Hospital Severe Hardship Evaluation Form

(1) Criterion	(2) Criterion Scale	(3) Score Factor	(4) Relative Importance Factor	(5) Criterion Score (5= 3x4)
A. Operating Profit Margin	1(-)5% or less	.9	.75	
	2(-)2% - (-)4.9%	.8		
	3(+)1% - (-)1.9%	.7		
	4(+)4% - (+)0.9%	.6		
	5 4% +	.5		
B. Percent Occupancy	1 .65 or less	.6	.25	
	2 .70 - .64	.8		
	3 .75 - .71	.7		
	4 .80 - .74	.6		
	5 .80 +	.5		

Total Hardship Evaluation Score_____

TABLE VII

(1) WEALTH INDEX			(2) PERCENTAGE OF TOTAL FUNDS FOR WHICH APPLICANT QUALIFIES
0.376 or less	-	0.764	90%
0.765	-	0.841	80%
0.842	-	0.919	73%
0.920	-	0.996	67%
0.997	-	1.074	65%
1.075	-	1.152	63%
1.153	-	1.229	61%
1.230	-	1.307	59%
1.308	-	1.384	58%
1.385	-	1.540	57%
1.541	-	1.695	56%
1.696	-	1.850	55%
1.851	-	2.005	54%
2.006	-	2.316	53%
2.317	-	2.781	52%
2.782	-	3.480	51%
3.480	+		50%

H. Encouraging Utilization of Solar Resource Measures

According to Federal Rules and Regulations the eighth element included in the North Carolina State Plan consists of:

> A Statement setting forth the extent to which, and by which methods, the State will encourage utilization of solar space heating, cooling and electric systems and solar water heating systems; (455.90h)

The Energy Division anticipates that renewable resource projects, including solar, will be vital to North Carolina's future energy needs. Therefore, it has provided eligible institutions with an opportunity to secure federal matching funds under the Grants Program for solar and other renewable resource projects. In order to encourage the conducing of Technical Assistance Analyses on buildings with high solar potential, the Division has introduced solar potential as a criterian within the Technical Assistance evaluation procedures of Section E of this Plan. The Division anticipates that this method will allow more solar conversion measures to emerge as feasible considerations than would otherwise occur.

In the evaluation of Technical Assistance applications a 15% Relative Importance Factor has been included for potential solar projects. This percentage is applied as indicated in Table I and is based on the following criteria:

1. Available Insolation

This criterion contains geographical location and site characteristics including:

a. Determination of average annual daily horizontal insolation received at the site from information provided by the State or from National Weather Service Data.

b. Determination by observation of the building or site's shading characteristics. (A building is considered "shaded" if 50% or more of its roof and south facing wall are shaded for more than 4 hours per day).

c. Determination of quantities of unshaded land adjacent to the building.

2. Type of Fuel

This criterion requires states to determine the type(s) of fuel used for space heating and domestic hot water.

3. General Building Characteristics

Building characteristics as they relate to Solar and Renewable Resource Potential is largely determined by shape and the horizontal or vertical distance between a potential solar installation and the primary heating, cooling and domestic hot water conversion equipment. Indicators are defined below:

a. An "excellent building is one which is square or rectangular, has an apparent sufficient area for a solar installation, and in which the location of the primary equipment is within 50 feet of an intended solar installation.

b. A "good" building is one whose shape adds to the complexity of a solar installation (i.e., H shape, E shape, etc.), but that has sufficient available space for solar, and whose primary equipment is located within 50 feet of an intended installation.

c. A "fair" building is one in which the shape adds complexity to a solar installation, the available space is limited and the primary equipment is located within 75 feet of the solar installation.

d. A "poor" building is one that adds extreme complexity to an installation, whose available free space is limited, and whose primary equipment is located within 75 feet from an intended solar installation.

4. Roof Characteristics

This criterion contains elements of height of pitch, orientation, construction materials, structural members and roof top obstructions. Indicators are defined below:

a. An "excellent" roof is one that is flat or pitched and south facing, has durable and easily worked roofing materials, has structural members with sufficient capacity to support additional weight, and is free of obstructions that would hinder installation nor cause shading.

b. A "good" roof is one that is flat or pitched facing within 20 degrees east or west of south, with minor roof obstructions but otherwise with the same characteristics as an "excellent" roof.

c. A "fair" roof is one that meets the "good" roof criteria but requires minor structural rework.

d. A "poor" roof is one that has many interfacing and shading roof top obstructions, a non-south oriented pitched roof, or that requires major structural reinforcement.

5. Wall Characteristics

This criterion requires measurement of glass area and assessment of construction materials.

a. It requires a determination of the glass area of the south facing walls as a percentage of the total south wall area and an identification of the predominant type of solid wall construction material.

6. Wind Data

This criterion requires estimation of wind speed and the ratio of barrier height to installation distance. Included are requirements to determine the average monthly wind speed using data either supplied by the State, or obtained from the National Weather Service or from local records. It should also be noted if there are any upwind or downwind natural or man-made barriers, located in the general vicinity of an intended wind equipment installation, in which the ratio of the height of the barrier to the distance from the intended installation exceeds 1/15.

7. Wood/Waste Data

This criterion requires an evaluation of the existing heating system. Characteristics of the heating system which are important include the type of distribution system and the size of the overall system. The Energy Division as part of the States Wood Energy Coordinating Group can recommend possible suppliers of wood fuel and a range of costs paid for wood fuel in North Carolina.

In the evaluation of applications for Energy Conservation measures the Division has included the weighting factors indicated in Table II for projects converting to solar or other renewable energy sources. Since the Regulations require the use of Simple Payback as a criterion for evaluation instead of discounted payback, this weighting will help to offset the potentially prohibitive consideration of solar conversion on the part of eligible institutions.

The Division feels it is important not to discourage a potentially valuable energy source in its technological infancy. Otherwise, discouragement may become irreversible when solar is able to hold its own on a basis of simple payback.

Included in the manual for Technical Assistance Analysts (see p. 81) is a chapter on solar energy and a chapter on wood energy. The solar chapter is largely taken from Appendix A Intermediate Minimum Property Standards 1977 Edition USHUD.

Other texts which will be mentioned in the workshops include Solar Heating and Cooling in Residential Buildings (GPO 003-011-00084-4) prepared by Colorado State University and Passive Solar Design by Edward Mazria.

I. Assuring Compliance With the State Plan, Federal Regulations and Other Energy Conservation Programs. (See also Section O, Page 76-81)

According to the Federal Rules and Regulations the ninth element included in the North Carolina State Plan is a statement of:

> The procedures to assure that all financial assistance under this part will be expended in compliance with the requirements of the State Plan, in compliance with the requirements of this part, and in coordination with other state and federal energy conservation programs. (455.90i)

The Energy Division will include, as part of its own application form for Technical Assistance and Energy Conservation Measures, Part V of OMB No. 038-R0402 Application Form provided by the U.S. Department of Energy. Part V includes twelve federal policies with which grant applicants must comply in order to be eligible for a Technical Assistance or Energy Conservation Measures Grant. The applicant will be required to assure that he will comply with regulations, policies, guidelines and requirements, including OMB Circular No. A-102 and FMC 74-4, as they relate to application, acceptance and use of federal funds for this federally assisted program. Also, with Part V, applicants will assure and certify with respect to the grant that:

1. It possess legal authority to apply for the grant; that a resolution, motion or similar action has been duly adopted or passed as an official act of the applicant's governing body, authorizing the filing of the application, including all understandings and assurances contained therein, and directing and authorizing the person identified as the official representative of the applicant to act in connection with the application and to provide such additonal information as may be required.

2. It will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and in accordance with Title VI of that Act, no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the applicant receives Federal financial assistance and will immmediately take any measures necessary to effectuate this agreement.

3. It will comply with Title VI of the Civil Rights Act of 1964 (42 USC 2000d) prohibiting employment discrimination where (1) the primary purpose of a grant is to provide employment or (2) discriminatory employment practices will result in unequal treatment of persons who are or should be benefiting from the grant-aided activity.

4. It will comply with requirements of the provisions of the Uniform Relocation Assistance and Real Property Acquisitions Act of 1970 (P.L. 91-646) which provides for fair and equitable treatment of persons displaced as a result of Federal and federally assisted programs.

5. It will comply with the provisions of the Hatch Act which limit the political activity of employees.

6. It will comply with the minimum wage and maximum hours provisions of the Federal Fair Labor Standards Act, as they apply to hospital and educational institution employees of State and local governments.

7. It will establish safeguards to prohibit employees from using their positions for a purpose that is or gives the appearance of being motivated by a desire for private gain for themselves or others, particularly those with whom they have family, business, or other ties.

8. It will give the sponsoring agency or the Comptroller General through any authorized representative the access to and the right to examine all records, books, papers, or documents related to the grant.

9. It will comply with all requirements imposed by the Federal sponsoring agency concerning special requirments or law, program requirements, and other administrative requirements.

10. It will insure that the facilities under its ownership, lease or supervision which shall be utilized in the accomplishment of the project are not listed on the Environmental Protection Agency's (EPA) list of Violation Facilities and that it will notify the Federal grantor agency of the receipt of any communication from the Director of the EPA Office of Federal Activities indicating that a facility to be used in the project is under consideration for listing by the EPA.

11. It will comply with the flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973, Public Law 93-234, 87 Stat. 975, approved December 31, 1976. Section 102(a) requires, on and after March 2, 1975, the purchase of flood insurance in communities where such insurance is available as a condition for the receipt of any Federal financial assistance for construction or acquisition purposes for use in any area that has been identified by the Secretary of the Department of Housing and Urban Development as an area having special flood hazards. The phrase "Federal financial assistance" includes any form of loan, grant, guaranty, insurance payment, rebate, subsidy, disaster assistance loan or grant, or any other form of direct or indirect Federal assistance.

12. It will assist the Federal grantor agency in its compliance with Section 105 of the National Historic Preservation Act of 1966 as amended (16 U.S.C.470), Executive Order 11593, and the Archeological and Historic Preservation Act of 1977 (16 U.S.C. 469a-1 et. seq.) by (a) consulting with the State Historic Preservation Officer on the conduct of investigations, as necessary, to identify properties listed in or eligible for inclusion in the National Register of Historic Places that are subject to adverse effects (see 36 CFR Part 800.8) by the activity, and notifying the Federal grantor agency of the existence of any such properties, and by (b) complying with all requirements established by the Federal grantor agency to avoid or mitigate adverse effects upon such properties.

13. It will expend funds granted under 10 CFR 455 for the purposes stated in the application and in compliance with the requirements of 10 CFR 455.

After the Energy Division has prioritized grant applications for Technical Assistance and Energy Conservation Measures, it will advise hospitals which are likely to receive funding and required to receive "1122" or certificate of need approval of their status and recommend that these hospitals apply for approval of a certificate of need. We will do this for the following reasons:

1. We have been advised that application for a certificate of need of 1122 approved costs approximately $5,000 many times. It is our feeling that few hospitals will apply for a grant if there is an associated cost of this magnitude of this amount.

2. A project may require a 1122 approval only if $100,000 of local funds will be used for a capital project. A project will require a certificate of need if the total funds spent on a capital project exceeds $150,000 (requiring a local match of at least $75,000). Therefore, any project that requires 1122 approval will also require a certificate of need approval is sufficient to receive 1122 approval.

3. The technical review for certificate of need in North Carolina is conducted by the Division of Facility Services, Department of Human Resources. By conducting a technical review of grant applications for the program, they will be aware of any conflicts with requirements of 1122/Certificate of Need approval. It should be mentioned that the Division of Facility Services has been active in promoting energy conservation.

J. Insuring Implementation and Continuation of Energy Conservation Maintenance and Operating Procedures

According to Federal Rules and Regulations the tenth element included in the North Carolina State Plan is a statement of:

> The procedures to insure implementation and continued use of energy conservation maintenance and operating procedures in those buildings for which financial assistance is awarded under this part. (455.90j)

Energy conservation maintenance and operating procedures are defined as:

> Modification in the maintenance and operations of a building, and any installation therein, which are designed to reduce the energy use in such building and which require no significant expenditure of funds. (455.2)

In order to insure the implementation and continuation of energy conservation maintenance and operating procedures, the Energy Division will:

1. Require that energy audit reports and technical assistance reports be submitted along with grant applications for Technical Assistance and Energy Conservation Measures. The energy audit and technical assistance reports will include identification of operational and maintenance measures for implementation and continuation.

2. Require grant applicants to provide written assurance that all energy conservation maintenance and operating procedures identified in an energy audit and/or a technical assistance analysis have been, and will continue to be, implemented, or to submit satisfactory written justification for not implementing a specific, identified procedure. For instance, a specific, identified procedure may be too expensive to implement in relation to an institution's maintenance and operating budget. Further, it may not be feasible to implement. If so, an explanation documenting lack of feasibility must be included.

3. Require technical assistance analysts to certify in technical assistance reports those operational and maintenance procedures to be implemented.

4. Monitor annual energy usage of eligible facilities. Annual energy usage by building will be added to the Preliminary Energy Audit data base annually. By analyzing energy usage trends, buildings with poor operational and maintenance procedures will easily be identified.

5. Make on-site inspections during construction and at completion of construction of at least 5% of all facilities receiving financial assistance under this program to determine if energy conservation procedures are being implemented. Division staff members plus coordinating agency personnel making on-site visits will identify areas that may not be in compliance. Teams of staff members and coordinating agency personnel will include professionals qualified to assess operating/maintenance compliance.

6. Encourage institution staff to conduct energy audit updates on an annual basis. Energy Audit updates should include identification of further operational and maintenance changes needed, recording of energy usage data and updating building systems information.

To encourage annual energy audits, successful programs will be publicized in order to demonstrate the value of energy management practices. The Division's Energy Audit materials will be revised each year, in cooperation with coordinating agencies, based on input from local and state energy auditors. It is anticipated that the Energy Audit and energy management itself will become recognized vehicles for structuring energy use patterns and insuring continued identification and implementation of operational and maintenance changes.

K. Procedures To Insure That Assistance Will Supplement and Not Supplant

According to Federal Rules and Regulations the eleventh element included in the North Carolina State Plan is a statement of:

> The procedures designed to insure that financial assistance under this part will be used to supplement, and not supplant, state, local or other funds. (455.90k)

Such procedures are necessary to insure that Federal assistance for both Technical Assistance and Energy Conservation Measures Programs is used to aid eligible institutions in developing and implementing projects they might otherwise not be able to undertake. Federal assistance is not to be used to subsidize projects that institutions are already able to finance with monies from local and/or state sources.

Another aspect of the supplement/supplant issue concerns the source of a grantee's matching share. As Attachment F of OMB Circular No. A-102 stipulates:

> In general, cost sharing and matching represents that portion of project costs not borne by the Federal Government. Usually, a minimum percentage for matching share requirements are included in the grant agreements.

In the case of Federal assistance for Technical Assistance and Energy Conservation Measures Programs, the required matching share is 50% except for those institutions qualifying for Hardship status.

In terms of the supplement/supplant question, the Energy Division will initiate procedures to insure that grantees do not use in-kind or cash contributions from Federal sources to match Federal monies allocated for Technical Assistance or Energy Conservation Measures Projects. This will include personnel hired with monies from other Federal Programs. The only exception to this exclusion of the use of Federal monies for matching purposes will be those monies received by hospitals through Medicare and Medicaid. These funds will be exempted because they are not viewed as direct allocations but as a form of reimbursement for medical costs incurred by patients.

To completely assure that a grant applicant is requesting financial assistance that will only supplement state, local or other funds would require a fairly comprehensive and extensive auditing of applicants' financial records. However, such an exhaustive procedure is probably not feasible given the commitment of staff and time it would require.

Therefore, the Division will require a written assurance from each grant applicant that funds requested for Technical Assistance or Energy Conservation Measures projects will be used to supplement and not to supplant state, local or other funds. To facilitate such assurance, the Division will include a specific item of assurance on grant application forms which stipulates that financial assistance being applied for will be used to supplement and not supplant monies from other sources. An official of each institution making application will be required to sign and submit this assurance item along with other assurances identified in Section I of this State Plan.

Spot-checks of samples of grantees will be conducted in conjunction with financial auditing procedures outlined in Section O of this State Plan. Monitoring teams will consist of Division staff and personnel from respective coordinating agencies. Teams

will seek out deviations in expenditures related to grant awards. That is, current annual expenditures should differ only from historical expenditures by an amount equivalent to a grantee's award.

The Division will select those grantees for monitoring and auditing spot-checks by first ranking all grantees according to the dollar value of grant awards. Then 10% of grantees falling in the highest third, 10% of the middle third and 10% of the lowest third will be randomly selected for spot-checks. In addition, all grants to coordinating or representatve agencies and any 'unusual' grants will be monitored and audited.

L. Determining Compliance of Non-Federally Funded Energy Audits With Federal Regulations

According to Federal Rules and Regulations the twelfth element included in the North Carolina State Plan is a statement of:

> The procedure for determining that energy audits performed without the use of Federal funds have been performed in substantial compliance with the requirements of 10 CFR part 450 for the purpose of satisfying the eligibility requirements contained in section 455.45(c). (§455.901)

Coordinating agencies in cooperation with the Energy Division have prepared written descriptions of individual Energy Audit materials and format developed under contract with the Division. Each separate Energy Audit package was developed to address the differing characteristics of each type of eligible institution within a format common to all types.

In order to determine whether or not energy audits have been performed in accordance with Federal Rules and Regulations, this State Plan and established Energy Audit Programs of North Carolina the Division has formulated the following procedures:

1. As indicated in Section J of this Plan, the Division will require that Energy Audit Reports be submitted in the format specified in the North Carolina Energy Audit Programs along with grant applications for Technical Assistance and Energy Conservation Measures. An applicant may need to transfer existing energy audit results and information from its own format or report to that of the Division's specified reporting format.

2. The Division will require that applications for Technical Assistance and Energy Conservation Measures identify the energy auditor and certify that the auditor has completed one of the training programs conducted by coordinating agencies. Audit reports submitted by auditors not meeting this criterion will be individually evaluated for completeness and accuracy by a committee or staff of the respective coordinating agency and Division personnel. Appendix C includes appointed members of just such a committee representing hospitals and public care institutions.

3. Energy audit reports will be further reviewed by the above mentioned committee and the Division to determine compliance with all Federal Rules and Regulations and this State Plan. If an energy audit report is determined to be incomplete or inadequate, the applicant will be notified and provided one week to correct deficiencies and submit an amended report.

M. Milestones For Accomplishment

According to Federal Rules and Regulations the thirteenth element included in the North Carolina State Plan consists of:

> The procedures for establishment of, and adherence to, milestones for accomplishment of technical assistance programs and energy conservation measures receiving financial assistance under this part; (§455.90m)

The Energy Division has determined that grant applications for Technical Assistance and Energy Conservation Measures will include a schedule with appropriate milestone dates for completing technical assistance or the design, acquisition and installation of proposed energy conservation measures. Milestones will be submitted by the institution for each building.

Table VIII presents the Division's Grant Milestone Plan to be completed and submitted by each applicant for Technical Assistance and Energy Conservation Measures. The following includes the purpose for the Grant Milestone Plan, Instructions for Completion, Charting Information and Conventions to assist applicants in its accurate completion.

A. Purpose

A baseline plan which displays work activity with the schedule for performing each task.

B. Instructions

Item 1 - Enter the grant identification number as it appears in the official establishing document and append the latest modification number.

Item 2 - Enter the task identification number as it appears in the work breakdown structure.

Item 3 - Enter the task identification/description.

Item 4 - Enter the inclusive start and completion dates of the budget period for which the plan is applicable.[3]

Item 5 - Enter the name and address of the agency or office responsible for performance of the task.*

Item 6 - Enter the start date of the original task.*

Item 7 - Enter the task completion date, as of the latest modification to the grant.*

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3. *These items need only be entered on the first page of multi-page reports.

TABLE VIII

GRANT MILESTONE PLAN

Page ___ of ___

1. Grant Identification No.	2. Task Number	3. Task Identification	4. Planning Period through
5. Performer (Name, Address)			6. Task Start Date
			7. Task Completion Date

8. Identification Number	9. Planning Category (Work Breakdown Structure Element)	10. Budget Period in Months	11. Contractual/ Agreement (Name of Performer)

12. Remarks

13. Signature of Program Manager and Date	14. Signature of Government Representative and Date

Item 8 - Enter milestone identification numbers.

Item 9 - Enter the major milestone description as it appears in the work breakdown structure.

Item 10 - In the lower portion of the space for the item heading, enter the first letter of each month of the budget period. Energy schedule data below the project year and month heading and to the right of each reporting category listed in Item 9. Use charting information shown at the end of these instructions.

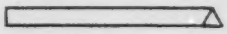
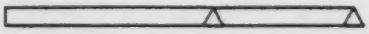
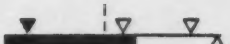
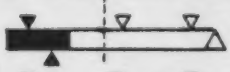
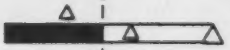
Item 11 - Enter the name of any contractor or outside agency performing for the major milestone described in Item 9.

Item 12 - Enter explanatory notes and brief comments. If more space is required, attach additional sheets and so indicate in this block.

Item 13 - Enter signature of responsible performer, central agency, or organization program manager and date signed.

Item 14 - Enter signature of the responsible Government Representative and date signed, verifying the reasonableness of the information furnished.

C. Charting Information

Symbols		Examples
△ Critical Milestone	A. 	(Critical milestone with an Activity bar)
	B.	(Time now and work done, event on critical path)
▽ Intermediate Event (Deliverable, Supporting Event, or Decision Point)	C. 	(First change approved)
▲ Intermediate Event completed early or late	D. 	(Activity ahead of schedule)
	E. 	(Activity behind schedule)
Activity Bar	F.	(Late and on time completion of intermediate events A and B, respectively)
Time Now	G.	(Original critical milestone date and four subsequent approved changes (all slippages) to that date)
	H. 	(Original critical milestone date and two subsequent approved changes (one slippage, one improvement) to that date)

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D. Conventions

1. Black-in figures or bars are used to show work done.

2. Open figures or bars show work not done.

3. △ (critical milestone) is twice as large as ▽ or ▲ (intermediate event).

4. Under no condition should more than one △ (critical milestone) be shown on a single horizontal line. (See Example C for a method of denoting a rescheduled critical milestone △ ; the number "1" indicates the first rescheduling.) Normally the original symbol △ would be shown with the latest rescheduled date (a △ with an associated number). In certain cases, where it is desired to show a complete history of rescheduling, a series of △'s with associated sequence numbers might be shown as in Example G. △'s (representing critical milestone) will be shown above the activity bar when it is blacked in. If it is not desirable to retain the rescheduling history. Conservation Offices may request that only the current approved critical milestone be shown.

5. Symbols for milestones may be used alone, with an activity bar, or with a time line as the prepared judges best.

6. Intermediate events may be shown only in association with an activity bar or a time line. These event symbols are placed above the bar or line and each is labeled for identification. A description of each intermediate event should be provided in an attachment to the Milestone Plan. One of the two methods is used to show when intermediate events are completed.

a. If the event is completed on time, it is blacked in as provided in Convention 1 above (see Example F, Event B).

b. If the event is completed early or late, the symbol for the intermediate event is inverted (▲) and shown below the line or activity, identified in the same way as the original, and both symbols are blacked in (see Example F, Event A).

By the end of January and July of each year, each grantee will submit, until project completion, a report to the Division describing milestones accomplished, milestones not accomplished, the status of in-progress activities, problems encountered and remedial actions planned.

Spot-checks described in Section K will include review of each Grant Milestone Plan and accompanying reports. During on-site visits the Division staff will review all project records and interview project staff to determine the extent to which the project's proposed Grant Milestone Plan has been adherred to.

N. Determining That Non-Federally Funded Technical Assistance Programs Are In Compliance With Federal Regulations

According to Federal Rules and Regulations the fourteenth element included in the North Carolina State Plan is a statement of:

> The procedures for determining that technical assistance programs performed without the use of Federal funds have been performed in compliance with the requirements of Section 455.42, for the purposes of satisfying the eligibility requirements contained in Section 455.51(a)(3). (§455.90n)

The Energy Division will prepare a written description of its Technical Assistance Analysis requirements and accompanying reporting format for distribution to eligible institutions through coordinating agencies listed in Appendix A. In order to determine whether Technical Assistance analyses have been performed in accordance with Federal Rules and Regulations and this State Plan, the Division has established the following procedures:

1. As indicated in Section J of this State Plan, the Division will require that Technical Assistance Reports be submitted in the format specified in the North Carolina Technical Assistance Program along with grant applications for Energy Conservation Measures. Applicants performing technical assistance without the use of Federal funds may need to transfer results and information fromm existing formats or reports to that of the Division's specified format and reporting procedure.

2. The Division will require that applicants for Energy Conservation Measures identify the Technical Assistance Analyst and include that individual's signature, registration number and certification of the accompanying Technical Assistance Report. Division staff and the committee of the respective coordinatin agency will evaluate and determine compliance of the analyst in accordance with requirements of Section P of this State Plan.

3. Division Staff and the committee of the respective coordinating agency will review each Technical Assistance Report to determine the extent of compliance with all Federal Rules and Regulations, this State Plan and the contents of the North Carolina Technical Assistance Program. If a Technical Assistance Report is determined to be incomplete or technically inadequate, the applicant will be provided one week to correct any deficiencies and submit an amended report.

O. Procedures For State Management, Financial Auditing, Monitoring and Evaluation

According to Federal Rules and Regulations the fifteenth element included in the North Carolina State Plann consists of:

> The procedures for State management, financial audit, monitoring and evaluation of technical assistance programs and energy conservation measures receiving financial assistance under this part; (§455.90o)

This element of the State Plan addresses the issue of the Energy Division's responsibilities after grants have been awarded by the U.S. Department of Energy to eligible institutions for Technical Assistance and Energy Conservation Measures. Regulations require that four administrative elements be addressed as follows:

1. Overall Project Management
2. Financial Auditing
3. Monitoring
4. Evaluation

Requirements for State management and follow-up monitoring of Technical Assistance and Energy Conservation Measures projects are specifically outlined in 10 CFR 455.73. Federal management requirements are listed in 10 CFR 455.3, and an outline of State record keeping requirements is provided in 10 CFR 455.4.

The Energy Division is responsible for direct program oversight and monitoring pursuant to §455.73(e). The Division is also responsible for compiling overall program performance information and data to indicate the effectiveness of those grants awarded in reducing energy consumption within the State of North Carolina.

Within 30 days of notification of grant awards by the U.S. Department of Energy, the Division and coordinating agencies listed in Appendix A will convene a meeting of all grantees. The purpose of this meeting will include presentation and explanation of each grantee's responsibilities, especially record keeping, as specified in federal regulations.

Each grantee will then be responsible for keeping all records and will be required to submit to the Division at the end of January and July of each year, until project completion, a report which shall detail milestones accomplished, financial status reports and an overall summary of project status. After conclusion of a Technical Assistance or Energy Conservation Measures Project, a grantee will be required to submit within ninety (90) days a final report to the Division which shall include a detailed summary of all work accomplished, a summary of difficulties encountered and solutions devised, and final financial reports completed.

In the case of Technical Assistance projects, the above report will outline information gathered on the facility and a recommended plan to implement energy conservation operating and maintenance measures and other procedures, along with a recommended outline or plan for implementing energy conservation measures. For completed Energy Conservation Measures Projects the report will include a listing and description of those measures installed, projected energy savings and a projected simple payback period.

All grantees will also be required to maintain records for at least three years after completion of a Technial Assistance or Energy Conservation Measures Project,

and shall be required to submit annual reports which will provide data on actual energy usage in the respective facility for the preceding twelve month period, and projected savings resulting from the project.

The Division will report to the Secretary of the U.S. Department of Energy at the close of each February and August, following State Plan approval, and shall provide information on those objectives accomplished under the Grants Program, problems encountered and solutions devised, along with a detailed report on financial expenditures (by all grantees and by the Division) under the Program. A summary of reports received by grantees during the preceding six months, along with other information as required by U.S. DOE or deemed important by the Division, will also be submitted at these times. The Division will also conduct yearly computations of energy saved as a result of participation in the Grants Program based on reported energy savings of grantees.

The Division and representative agencies will conduct monitoring and evaluation of Technical Assistance and Energy Conservation Measures Projects both during and after completion. The Energy Division will be responsible for on-site monitoring and evaluation. A team of Division staff and the committee of each respective coordinating agency will review biannual reports from grantees participating in the Grants Program. Apparently problems indicated in any given report will automatically present a need for closer monitoring and evaluation of respective projects. Monitoring teams of Division staff will also conduct on-site review and follow-up monitoring of a random number of biannual reports to assess technical accuracy and administrative reliability of data provided, as well as to check for compliance with all federal and state requirements specified in previous sections of this State Plan. From 5% to 10% of funded projects will under such on-site monitoring and evaluation.

In addition, a random sample of in-progress Technical Assistance and Energy Conservation Measures Projects will be selected for on-site monitoring and evaluation in accordance with selection procedures of Section K of this State Plan. On-site visitation will include a thorough management audit up to that point in time. Included also will be an evaluation of progress and the rate of completion of all tasks.

After completion of each Technical Assistance and Energy Conservation Measures Project, grantees will submit a final report to the Division. Final reports will be reviewed by Division staff and a committee of the appropriate representative agency,. The Division and representative agency personnel will conduct follow-up evaluations on-site of a random sample of a minimum of 5% of all final project reports to assess the reliability of information included and to check compliance with program requirements. The Energy Division will conduct on-site evaluation of a minimum of 5% of completed projects which will include a complete management audit of the entire project, a complete financial audit of all expenditures and overall evaluation.

A primary objective of random on-site monitoring and evaluation will be to assess the effectiveness of grants in reducing energy consumption in each facility. In addition, follow-up visitations will continue for a period of at least three years after project completion. Such visitations are expected to measure continued implementation of all energy conservation operational and maintenance procedures identified within each project, and to assess the effectiveness of retrofit measures conducted.

Finally, the Division will establish and maintain an on-going data base of information received pursuant to preliminary energy audits, energy audits, technical assistance analyses and energy conservation measures conducted within each institutional category. This data base will permit the Division to continually assess energy

consumption levels and savings by institution, by institutional type and throughout the State of North Carolina. The Division will maintain and expand its communication system to disseminate progress and exemplary projects and activities. When institutions are not in compliance with program regulations, the Division will make every effort to assist the institution to come under compliance or receive an exemption if applicable. If the institution remains out of compliance tne Division will report this fact to DOE.

P. Qualifications for Technical Assistance Analysts

According to Federal Rules and Regulations the sixteenth element included in the North Carolina State Plan is:

> A description of the State's program for establishing and insuring compliance with qualifications for technical assistance analysts. (455.90p)

The Energy Division has established that Technical Assistance Analysts in the State of North Carolina will be required to:

1. Have experience in energy conservation; and

2. Be a registered architect or registered professional engineer licensed under the regulatory authority of the State of North Carolina, or be an architect-engineer team, the principal members of which are licensed under the regulatory authority of the State of North Carolina; and

3. Comply with the licensing provisions of the "Architects" Act (Chapter 83A of the General Statutes of North Carolina) and/or the "Engineering and Land Surveying" Act (Chapter 89C of the General Statutes of North Carolina), to the extent to which one or both may be applicable. Certification to perform Technical Assistance Analyses will not entitle an individual to practice architecture or professional engineering in violation of State law.

In July, 1980 the Division will conduct three day training sessions for prospective technical assistance analysts in addition to the above requirements. The course will present instruction on each element of a Technical Assistance Analysis. Prospective analysts will be offered the training program and will be required to successfully complete the established course. Any Technical Assistance Analyses conducted after October 1, 1980, will be required to be conducted by an analyst certified by this training program.

The Division will contract with North Carolina State University, Industrial Extension Service to develop the North Carolina Technical Assistance Program and training materials in accordance with the North Carolina Professional Engineers and the North Carolina Chapter of the American Institute of Architects. The program will require a Technical Assistance Analysis to include the following:

1. A description of building characteristics and energy data including:

   a. the operating characteristics of energy using systems, and

   b. the estimated remaining useful life of the building;

2. An analysis of estimated energy consumption of the building by fuel type (in total Btu's and Btu/sq.ft./yr.) at optimum efficiency (assuming implementation of all energy conservation operating and maintenance procedures);

3. A description and analysis of all recommendations, if any, for acquisition and installation of energy conservation measures, including solar and other renewable resource measures, setting forth:

a. a description of each recommended energy conservation measure;

b. an estimate of the cost of design, acquisition and installation of each energy conservation measure;

c. an estimate of the useful life of each energy conservation measure;

d. an estimate of increases or decreases in maintenance and operating costs that would result from each energy conservation measure, if any;

e. an estimate of the salvage value or disposal cost of each energy conservation measure at the end of its useful life, if any;

f. an estimate of the annual energy and energy cost savings (using current energy prices) expected from the acquisition and installation of each energy conservation measure. In calculating the potential energy cost savings of each recommended energy conservation measure, including solar or other renewable resource measure, technical assistance analysts shall:

i. Assume that all energy savings obtained from energy conservation maintenance and operating procedures have been realized;

ii. Calculate the total energy and energy cost savings, by fuel type, expected to result from the acquisition and installation of all recommended energy conservation measures, taking into account the interaction among the various measures; and

iii. Calculate that portion of the total energy and energy cost savings as determined in (ii) above, attributable to each individual energy conservation measure.

g. the simple payback period of each recommended energy conservation measure, taking into account the interactions among the various measures. The simple payback period is calculated by dividing the estimated total cost of the measure by the estimated annual cost saving accruing from the measure. The simple payback period shall be calculated using the cost savings resulting from energy savings only, determined on the basis of current energy prices. The estimated cost of the measure shall be the total cost for design and other professional services (excluding costs of a technical assistance program), if any, and acquisition and installation costs. Other economic analyses, such as life-cycle costing, which consider all costs and cost savings, such as maintenance costs and/or savings, resulting from an energy conservation measure, are recommended, but not required for use by the institution in its decision making process;

4. A listing of energy use and cost data for each fuel type used for the prior 12-month period.

Realizing the need for consistency in Technical Assistance Reports, thereby maintaining uniformity for the comparison of proposed Energy Conservation Measure grants applications, calculation procedures shall be limited to either single or multiple measure methods, and specific procedures for active and passive solar energy systems prescribed by this section. As applied, these methods shall be incorporated into determinating the energy savings resulting from the implementation of Operating and

Maintenance procedures and Energy Conservation Measures. This requirement shall pertain only to Technical Assistance Reports prepared either as a result of Technical Assistance grants awarded during the third grant cycle; or for the purpose of making Energy Conservation Measure grant application after January 1, 1982.

1. Simple buildings having floor areas less than 2,500 gross square feet, which also have heating and/or cooling controlled from a single thermostat, may be analyzed with single measure methods as follows:

a. Degree Day Method (For heating energy only)
Heating energy requirements computed by the degree day method shall be in strict accordance with Chapter 43 of ASHRAE, Systems Volume, 1980.

b. Equivalent Full Load Hours (For cooling energy only)
Cooling energy requirements computed by the equivalent full load hour method shall be in strict accordance with Chapter 43 of ASHRAE Systems Volume, 1980.

c. Methodologies Described in Architects and Engineers Guide to Energy Conservation in Existing Buildings, DOE/CS-0132, U.S. Department of Energy, Washington, D.C., February 1, 1980.

d. Methodologies having received the prior approval of the Department of Commerce, Energy Division in advance of the preparation and submittal of the analysis to the Energy Division.

2. Buildings having floor areas larger than 2,500 gross square feet, or smaller buildings with heating/cooling systems serving more than one space or conditioned area, each of which controlled individually, shall be analyzed by means of multiple measure method. Acceptable multiple measure methods shall be defined as;

a. Bin Method - Heating and cooling energy requirements are computed by mathematically "modeling" the building or system at a large number of different outdoor dry-bulb temperature conditions, and multiplying the result by the number of hours of occurance of each calculation. The minimum requirements for Bin analysis shall be as defined in Chapter 43 of ASHRAE Systems Volume, 1980.

b. Hour-by-Hour - Hour-by-Hour procedures calculate the hourly heating and cooling loads, and simulate the HVAC components and systems to arrive at hourly energy requirements which are summed for monthly and annual totals. Hour-by-Hour analysis requires the use of a computer program utilizing ASHRAE algorithms for calculating the hourly heating and cooling loads, and procedures for simulating the performance of components and systems.

c. Methodologies described in Architects and Engineers Guide to Energy Conservation in Existing Buildings, DOE/CS-0132, U.S. Department of Energy, Washington, D.C., February 1, 1980.

d. Methodologies having received the prior approval of the Department of Commerce, Energy Division in advance of the preparation and submittal of the analysis to the Energy Division.

3. Active solar energy systems shall be analyzed utilizing either of the following methods:

a. F-CHART - The F-CHART method is presented as Appendix A of HUD Intermediate Minimum Property Standards Supplement, 1977 Edition, No. 4930.2, U.S. Department of Housing and Urban Development. Building loads shall be determined in accordance with paragraphs 1 and 2 above for use as an input parameter when analyzing solar space heating systems.

b. Methodologies having received the prior approval of the Department of Commerce, Energy Division in advance of the preparation and submittal of the analysis to the Energy Division.

4. Passive solar energy systems shall be analyzed utilizing either of the following methods:

a. Procedures presented in Passive Solar Handbook, DOE/CS-0127/2, U.S. Department of Energy CA7#UC-59, Office of Solar Applications, Passive and Hybrid Solar Buildings Program, Washington, D.C. 20585; January, 1980.

b. Methodologies having received the prior approval of the Department of Commerce, Energy Division in advance of the preparation and submittal of the analysis to the Energy Division.

It shall be the responsibility of the Technical Assistance analyst to obtain written approval from the Energy Division for methodologies allowed under paragraphs 1d, 2d, 3b, and 4b contained within this section. Furthermore, it shall be the responsibility of the Technical Assistance analyst to provide written justification, along with documentation substantiating such justification, as to the reasonableness of the alternative methodology. Acceptable documentation shall demonstrate either a) the alternate methodology produces more accurate results than methologies prescribed by paragraphs 1a, 1b, 2a, 2b, 3a, 4a, depending upon the building characteristics, or b) the prescribed methodology is deficient with respect to the modeling of the building energy use characteristics.

The Energy Division reserves the right to request listings of computer program input and output which may result from paragraphs 1 through 4 above for inclusion in Technical Assistance Reports to demonstrate compliance with these requirements.

The following methods will be used to insure that competent Technical Assistance Analyses are submitted to the Division. Building owners will be advised by the Division of a recommended way of procuring a competent analysis of his/her building and what should be expected in a comprehensive analysis. The Division will also review other Technical Assistant reports or send these reports to other appropriate State agencies for their review. If Technical Assistance reports are submitted where either engineering or architecture aspects of the analysis have not been addressed, then reimbursement of that report will be held back until a comprehensive report is submitted.

The Energy Division and coordinating agencies will inform all eligible institutions of the qualifications of Technical Assistance Analysts and the proposed training program. If an institution has selected an analyst prior to submitting its application for a Technical Assistance project, the analyst's signature and registration number must appear on the application. If a Technical Assistance Analyst has not been selected at the time of application, the institution will be informed that its final Technical Assistance Report

will not be approved by the Energy Division if the analyst eventually selected does not meet established qualifications.

Q. Procedures For Appointment of Funds Among Eligible Institutions Within The State

According to Federal Rules and Regulations the seventeenth element included in the North Carolina State Plan is a description of:

> The procedures for apportionment of funds among eligible institutions within the State. As a minimum, such policies and procedures shall assure a separate priority ranking pursuant to the provisions of 455.71 for each building covered by an application approved pursuant to the provisions of 455.70 for -
>
> (1) Technical assistance programs for units of local government and public care institutions;
>
> (2) Technical assistance programs for schools and hospitals; and
>
> (3) Energy conservation measures, including solar and other renewable resource measures, for schools and hospitals. (§455.90q)

The Energy Division will employ three separate rankings in compliance with Federal Regulations above and in accordance with Section F of this State Plan. For Units of Local Government and Public Care Institutions, three factors will be noted for apportionment:

1. There will be no apportionment for Energy Conservation Measures,

2. Apportionments for Technical Assistance are for fiscal years 78 and 79 only,

3. There will be no apportionment for hardships.

For Schools and Hospitals:

1. Amounts available for hardship (10%) and matching administrative expenditures (5%) will be based on North Carolina's total allocation for 50% matching funds for Technical Assistance and Energy Conservation Measures.

2. Of fiscal year 78, a maximum of 30% of funds available for Technical Assistance and Energy Conservation Measures will be allocated for Technical Assistance projects. Of fiscal years 79 and 80, maximum Technical Assistance allocations will be 15%.

Determination of which applicants are to be recommended for federal financial assistance will be an outcome of the Division's evaluation and ranking procedures as specified in Section E and allocation procedures as specified in Section F of this State Plan. Apportionments for either School and Hospitals will not be less than 30% of the State's total allocation for Technical Assistance and Energy Conservation Measures.

The Division will identify in descending order of priority those applications from Schools, Hospitals, Units of Local Government and Public Care Institutions that qualify for recommendations for funding. Then tabulating total amounts to be recommended for funding for all Schools and Hospital applications, amounts above the minimum levels will be assessed and total funding amounts will be adjusted in accordance with Section F of this State Plan if in violation of this minimum percentage. Hardship Evaluation criteria for Schools and Hospitals will be applied to those applicants qualifying for 50%

funding consideration, in accordance with procedures specified in Section G of this State Plan.

Appendix A

NORTH CAROLINA STATE AGENCIES

and

STATEWIDE REPRESENTATIVE ASSOCIATIONS

North Carolina State Agencies

Department of Human Resources, Division of Facility Services

State Commission on Higher Education Facilities

Department of Education, Division of Plant Operations

Department of Education, School Planning Division

Department of Education, Non-Public Schools

Department of Education, Community Colleges

Department of Natural Resources and Community Development, Community Assistance Division

Department of Administration, Policy Development Division

Statewide Representative Association

North Carolina Hospital Association

North Carolina Association of Independent Colleges and Universities

Professional Engineers of North Carolina

American Institute of Architects, North Carolina Chapter

North Carolina League of Municipalities

North Carolina County Commissioners Association

Appendix B

HOSPITALS AND PUBLIC CARE FACILITIES

A. PRELIMINARY ENERGY AUDIT (10 CFR 450.42)

1. Building Name _____
   Address: Street _____
   City _____, N.C. Zip _____

   Person Completing the Audit _____
   Telephone _____/_____

2. Building Category

   Hospital

   Public Care Facility

3. Functional Use

Hospitals:	Public Care:
____ General	____ Nursing Home
____ Tuberculosis	____ Long-Term Care
____ Psychiatric	____ Rehab. Center
____ Other, Specify	____ Orphanage
_____	____ Public Health Center
_____	____ Residential Child Care
_____	____ Other, Specify
	_____
	_____
	_____

4. Owner of Record

   Name: _____
   Address: _____
   _____, N.C. Zip _____
   Area Code and Telephone No. _____

5. Building Size (Floor Area)

   _____ Gross Square Feet

6. Age of Building

_____ Years

7. Operation Schedules

Day(s)	Time Period	Average Occupancy	% GSF or Occupied	No. Hrs.	Weeks/Year
Mon-Fri	day				
	evening				
	night				
Saturday	day				
	evening				
	night				
Sunday	day				
	evening				
	night				

Vacation Period Use

Months of Vacation Period (circle); J F M A M J J A S O N D

If none, check _____

Vacation Use (Describe): _____

_____

_____

8. Identify Major Energy-Using Systems:

PRIMARY HEATING SYSTEMS

Gas

___ Hot Water Boiler
___ Steam Boiler
___ Unit Heaters
___ Infrared
___ Dual Fuel System
___ Other (Explain)

_____

Steam

___ Purchased Steam
___ Coal-Fired
___ Other (Explain)

_____

Electric

___ Heat Pump
___ Hot Water Boiler
___ Steam Boiler
___ Unit Heaters
___ Other (Explain)

_____

Oil

___ Hot Water Boiler
___ Steam Boiler
___ Unit Heaters
___ Other (Explain)

_____

PRIMARY COOLING SYSTEMS

___ Heat Pump
___ Absorption System (steam, water)
___ Central Electric
___ Turbine Driven
___ Incremental Electric
___ Other (Explain)
_____

TERMINAL HEATING AND COOLING (DELIVERY SYSTEM)

___ R-Heat
___ Finned Tube Water
___ Finned Tube Steam
___ Radiator Steam
___ Radiator Water
___ Air (fan coil mixing boxes)
___ Window Air Conditioners
___ Other (Explain)
_____

DOMESTIC WATER

___ Electric
___ Natural Gas
___ Oil
___ Steam Coil
___ Hot Water Coil
___ Other (Explain)
_____

PRIMARY AIR HANDLING SYSTEMS

___ Constant Volume
___ Variable Volume
___ Dual Duct
___ Hot/Cold Deck
___ Roof Top Units
___ Multi-Zone Units
___ Other (Explain)
_____

SPECIAL SYSTEMS

___ Food Preparation
___ Sterilizing
___ Make-up Air Heater
___ Environmental Areas
___ Elevators
___ Laundry
___ Other (Explain)
_____

9. Fuel Use

Month	Gas Cost	Gas CCF	Propane or Oil Cost	Propane or Oil Gal.	Elec. Cost	Elec. KWH	Other Cost
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
TOT							

10. Annual cost for each fuel above per square foot as calculated in Item 5.

FUEL TYPE	ANNUAL COST PER SQUARE FOOT
Natural Gas	$_____
Electricity	_____
Coal	_____
LP Gas	_____
Oil	_____

11. Summary of BTU energy use:

Fuel	Current Gross Annual Usage		Conversion Factor		BTU Consumption	BTU/GSF
Electricity	_____ KWH	x	11,600	=	_____	_____
Natural Gas	_____ CCF	x	103,000	=	_____	_____
#2 Oil	_____ Gal	x	138,690	=	_____	_____
#6 Oil	_____ Gal	x	149,690	=	_____	_____
Coal	_____ Ton	x	22,500,000	=	_____	_____
LP Gas	_____ Gal	x	95,476	=	_____	_____

12. Solar Energy System

(a) Is there roof space on adjacent open areas in which a collector bank could be installed? ___ Yes ___ No

(b) Building location? ___ Urban ___ Suburban ___ Rural

(c) Is roof shaded more than four hours per day? ___ Yes ___ No

(d) How many stories? _____

(e) Building shape? ___ Square ___ Rectangular
___ E-Shaped ___ H-Shaped
___ L-Shaped ___ T-Shaped
___ Other: _____

(f) Roof type? ___ Flat ___ Pitched

(g) If pitched roof, does roof face South? ___ Yes ___ No

(h) Is roof clear of obstructions? ___ Yes ___ Mostly
___ Partially ___ No

(i) Does the building have a South-facing wall? ___ Yes ___ No

(j) If yes, what is the construction?

___ Masonry
___ Wood
___ Metal Siding
___ Other: _____
_____

(k) If yes, is the South-facing wall shaded by trees or other buildings for more than four hours per day? ___ Yes ___ No

(l) If yes, how much glass is in South facing wall?
___ less than 25%
___ 25-75%
___ greater than 75%

(m) Location of primary heating equipment:

_____

_____

(n) Location of service water heating equipment:

_____

_____

13. Energy Conservation Activities

(a) Has a person been designated to monitor and evaluate energy use? ___ Yes ___ No

(b) Has an energy audit been performed? ___ Yes ___ No

(c) Have detailed energy studies been performed by engineer or architect-engineer teams? ___ Yes ___ No

(d) Have major energy conservation measures been implemented? ___ Yes ___ No

Energy Conservation Measures	Est. Cost	Estimated Energy Savings (MBTU/YR)

Appendix C

ENERGY ADVISORY COMMITTEE

NORTH CAROLINA HOSPITAL ASSOCIATION

1. Charles Hite - CHAIRMAN
   Director, Planning and Design Services
   The Duke Endowment
   Charlotte, NC

2. Joseph H. James, Jr.
   Administrator
   Wayne County Memorial Hospital
   Goldsboro, NC

3. Mr. Bill Barnes
   Manager of Energy Resources
   North Carolina Memorial Hospital
   Chapel Hill, NC

4. John Klimkowski
   Chief Engineer
   Gaston Memorial Hospital
   Gastonia, NC

5. Mr. Paul Betzold
   Sr. Vice President
   Presbyterian Hospital
   Charlotte, NC

TECHNICAL ADVISORY

Conrad Taylor
Chief, Construction Section
Division of Facility Services
NC Department of Human Resources
Raleigh, NC

Appendix D

Wealth and Local Support for Schools

In 1978 the Governor's Commission on Public School Finance assigned each North Carolina county a wealth index in an effort to study equalization of funds for public education[4]. A ranking of North Carolina counties by wealth, based on the report of the Governor's Commission, and consideration of various factors concerning local support of schools have yielded the following conclusion: the poorest counties not only have fewer dollars to spend but budget a smaller percentge of their total local resources for education.

The poorest counties have more difficulty getting a local school bond issue passed. This conclusion is based on the history of local school bond issues from January, 1969, through June, 1979[5]. While the thirty-three wealthiest counties, the thirty-four middle counties, and the thirty-three poorest counties have been equally successful in scheduling issues, the poorest counties have had far less success passing theirs. Of the wealthiest group, twenty-one counties have scheduled bond issues and sixteen have passed them, their rate of success being 76%. In addition, twenty counties of the medium-wealth group have had issues; nineteen (95%) of those have been successful. However, twenty counties of the poorest group have scheduled issues, but only eight (a low 40%) were able to pass them.

Since the poorest counties have more difficulty passing local school bond issues, they must rely on monies in county budgets to give them local dollars for capital outlay. However, over a seven-year period (1971-1977) the poorest counties have spent fewer local dollars on capital outlay for schools[6]. The wealthy and medium groups of counties have averaged $540 and $470 per pupil, respectively, whereas the poorest group has averaged only $270 per pupil for local capital outlay.

Even more importantly, local governments of the poorest counties have put a lower percentage of total local resources into capital outlay for schools. School systems in the wealthy and medium-wealthy counties have received 14 and 17% of their counties' total local resources for capital outlay over the seven years, while the school systems in the poorest counties were given only 11%.

The same pattern is occurring in the local current expense budget. In 1976-77, the wealthiest counties averaged spending 40% of their counties' total local resources for current expense; the middle group spent 34%; and the poor group spent 31%.

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4. The Governor's Commission on Public School Finance, Access to Equal Educational Opportunity in North Carolina (Raleigh, NC:1978), p. 176. Only selected counties' indices were published in this report. For a complete listing of wealth indices as obtained from Jean Thompson, Governor's Commission on Public School Finance, see the attached appendix.
5. See attached appendix.
6. The remainder of the data in this report is a compilation of material from the Division of School Planning, School Finance (1978); MIS; Financial Reports of the NC School Systems; and the NC Department of Revenue, Tax Research Division.

In conclusion, the poorer counties not only have fewer dollars to spend, but also budget a smaller percentage of their total local resources for education, both in current expense and capital outlay.

Rank of Wealth	County or City Administrative Unit	Wealth Index 1975-76	School Bond Issues January 1969-June 1979 (+) For Issues Approved (-) For Issues Declined
1.	Dare County	3.480	(1978+)
2.	Brunswick County	2.433	(1969+) (1977+)
3.	Mecklenburg County	2.367	
4.	Forsyth County	2.110	
5.	Macon County	1.935	(1975-)
6.	Catawba County	1.901	(1974+)
	Hickory City	1.901	
	Newton City	1.901	
7.	New Hanover County	1.800	(1974+)
8.	Wake County	1.764	(1970-) (1971-) (1973+)
9.	Guilford County	1.758	(1971+)
	Greensboro City	1.758	
	High Point City	1.758	
10.	Durham County	1.593	(1971-) (1972-)
	Durham City	1.593	(1972-)
11.	Orange County	1.526	(1976+)
	Chapel Hill City	1.526	
12.	Stokes County	1.511	(1971-) (1972+)
13.	Jackson County	1.365	(1969+) (1977+)
14.	Carteret County	1.349	(1974-) (1978+)
15.	Buncombe County	1.335	
	Asheville City	1.335	
16.	Rowan County	1.298	
	Salisbury City	1.298	
17.	Person County	1.268	(1978+)
18.	Watauga County	1.219	(1969+)
19.	Henderson County	1.206	(1969+)
	Hendersonville City	1.206	
20.	Alleghany County	1.176	
21.	Transylvania County	1.121	(1970-) (1972+)
22.	Iredell County	1.113	
	Mooresville City	1.113	
	Statesville City	1.113	
23.	Alamance County	1.053	
	Burlington City	1.053	
24.	Wilson County	1.046	(1969-)
25.	Lee County	1.045	
26.	Moore County	1.041	
27.	Lenoir County	1.027	(1973-) (1976+)
	Kinston City	1.027	
28.	Gaston County	1.017	
29.	Beaufort County	1.010	
	Washington City	1.010	
30.	Pitt County	1.009	(1979-)
	Greenville City	1.009	
31.	Montgomery County	.976	(1974-)

32.	Rockingham County	.973	
	Eden City	.973	
	Madison-Mayodan City	.973	
	Reidsville City	.973	
33.	Surrey County	.959	(1972+)
	Elkin City	.959	
	Mt. Airy City	.959	
II. 34.	Haywood County	.934	
35.	Ashe County	.934	
36.	Burke County	.934	
37.	Davie County	.927	(1978+)
38.	Union County	.913	(1973+)
	Monroe City	.912	
39.	Chatham County	.910	(1969+)
40.	Davidson County	.909	(1971+)
	Lexington City	.909	
	Thomasville City	.909	
41.	Rutherford County	.889	
42.	Cabarrus County	.875	(1972-) (1978+)
	Concord City	.875	
	Kannapolis City	.875	
43.	Martin County	.873	(1969-) (1972+)
44.	Stanly County	.870	
	Albemarle City	.870	
45.	Edgecombe County	.868	(1976+)
	Tarboro City	.868	
46.	Nash County	.861	
	Rocky Mount	.861	
47.	Currituck County	.840	(1969-) (1974+)
48.	Lincoln County	.827	(1969-) (1972+)
49.	Cleveland County	.807	(1972-) (1973+)
	Kings Mountain City	.807	(1972+) (1973+)
	Shelby City	.807	(1972+) 1973+)
50.	McDowell County	.799	
51.	Yadkin County	.795	
52.	Pasquotank County	.795	
53.	Polk County	.794	
	Tryon City	.794	
54.	Vance County	.785	(1972+)
55.	Craven County	.763	
	New Bern City	.763	
56.	Onslow County	.763	
57.	Randolph County	.762	(1978+)
	Asheboro City	.762	
58.	Wayne County	.753	
	Goldsboro City	.753	
59.	Yancey County	.743	(1973+)
60.	Caldwell County	.740	(1971+)
61.	Cumberland County	.737	(1969+) (1979-)
	Fayetteville City	.737	
62.	Mitchell County	.734	(1974+)
63.	Chowan County	.729	(1978-)
64.	Hertford County	.728	(1976+)

65.	Scotland County	.723	
66.	Halifax County	.716	(1979+)
	Roanoke Rapids City	.716	
	Weldon City	.716	
67.	Wilkes County	.686	(1974-) (1977+)
68.	Perquimans County	.676	(1977-)
69.	Hyde County	.674	(1969-)
70.	Swain County	.649	(1974+)
71.	Jones County	.639	(1976-) (1976-)
72.	Pender County	.605	(1977-) (1978-)
73.	Avery County	.584	(1976-)
74.	Tyrrell County	.584	
75.	Richmond County	.568	(1969+)
76.	Bladen County	.552	
77.	Anson County	.547	(1969-)
78.	Franklin County	.544	(1976-)
	Franklinton City	.544	
79.	Duplin County	.537	
80.	Washington County	.532	(1979-)
81.	Sampson County	.524	(1972+)
	Clinton City	.524	(1969-) (1973+)
82.	Granville County	.522	
83.	Harnett County	.520	(1973-) (1974-)
84.	Bertie County	.517	
85.	Johnston County	.516	
86.	Columbus County	.509	
	Whiteville City	.509	
87.	Alexander County	.491	(1977-)
88.	Cherokee County	.462	(1971+)
89.	Camden County	.461	(1977+)
90.	Graham County	.458	
91.	Caswell County	.456	(1974-)
92.	Hoke County	.451	(1974+)
93.	Madison County	.447	(1970+) (1979-)
94.	Clay County	.436	
95.	Northampton County	.425	
96.	Warren County	.416	
97.	Gates County	.393	
98.	Greene County	.393	(1969-)
99.	Robeson County	.386	(1979+)
	Fairmont City	.386	
	Lumberton City	.386	
	Maxton City	.386	
	Red Springs City	.386	
	St. Paul City	.386	
100.	Pamlico County	.376	

NOTE: Since July 1, 1973, all bond issues for school construction must be countywide.